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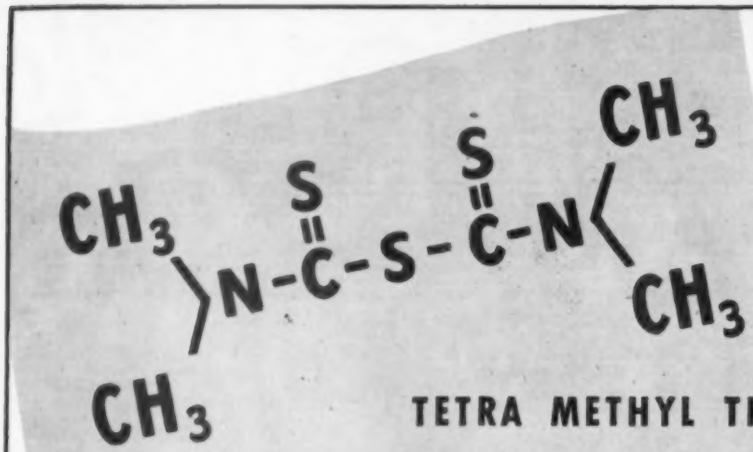

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The RUBBER AGE

VOL. 47, No. 5 AUGUST, 1940

Producing 11,000 Treads a Day at the Ford Tire Plant

By R. L. FINDLEY

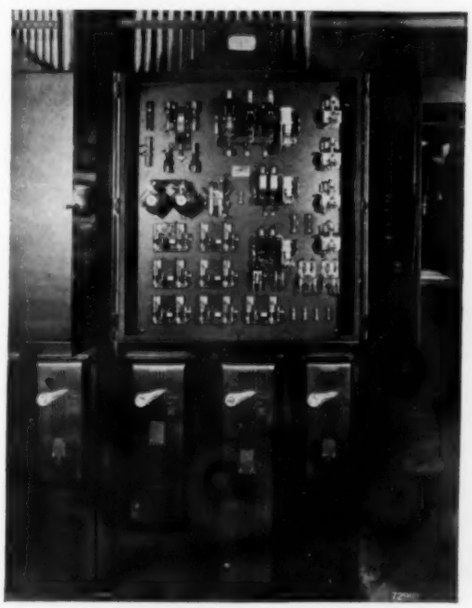
Industrial Engineer,
Westinghouse Elec. & Mfg. Co.

COMPLETELY automatic machines at the Dearborn plant of the Ford Motor Company produce 57¼-inch tire treads, uniform in quality and weight, at an average of about 11,000 during a 24-hour period. Speed range of the entire system is variable over a range of from 15 to 60 feet per minute, so that tread lengths may be produced continuously at a rate of from 3 to 12 per minute—4,320 to 17,280 in 24 hours—depending on demand. Extruded treads are cooled uniformly and adequately, then cut accurately in correct lengths.

The quality of the rubber determines the wearing life of the tire and is a factor in tire safety. Uniform weight of tread for one tire length is necessary to prevent unbalance of the completed tire. An adjustable speed range of this equipment provides the correct operating speeds for various weights or thicknesses of tire treads and side walls. Automatic operation eliminates the human factor and reduces waste from this source to a minimum.

The production system consists essentially of a tuber or tubers from which the stock is carried over a system of conveyors where it is weighed, cooled, and finally cut into lengths. The conveyor system is driven by direct-current motors, while the cutting wheel and cutter feed on the last conveyor are driven by squirrel-cage induction motors. The control for all of these motors is entirely automatic from the time the rubber leaves the tuber until it is accurately cut into lengths.

The system is shown schematically in the accompanying diagram. Rubber is extruded simultaneously from the tubers onto the first conveyor belt section where a weighing device indicates whether it is cor-



Control cubicle and motor starters for the Ford tire conveyor system.

rect, underweight, or overweight. Correction in weight may be made either manually or automatically by a vernier speed control on the scale conveyor. From this conveyor the tread is carried by an approach conveyor belt to a system of three water-cooling conveyors. After passing successively through these cooling units the tread moves on through three sections of air cooling conveyors. The last conveyor unit is the cut-off belt. From the tubing machine to this last conveyor unit the tread is carried at a uniform speed, but the operation of the cut-off belt is intermittent. On this cut-off conveyor, as the tread approaches the desired length, the speed of the conveyor is reduced to a low value for a short distance and then stopped by a limit switch giving highly accurate cutting.

The tread is clamped tightly in place and the cutting wheel, driven at a constant speed by its a-c motor, is moved quickly across the tread by a feed motor driven by a specially designed a-c motor. At the end of its travel the cutter wheel is raised by means of an air valve so that the conveyor may be started while the cutter returns to its original position. While the cut is being made, tread stock is accumulating in the loop from the cooling conveyors, and, consequently, the cutter conveyor must run at a higher maximum speed than the other conveyors to take up this loop and give an average speed equal to that of the entire system. For any setup the operation is entirely automatic, the tread stock being cut when the proper length of tread has passed beyond the cutting knife.

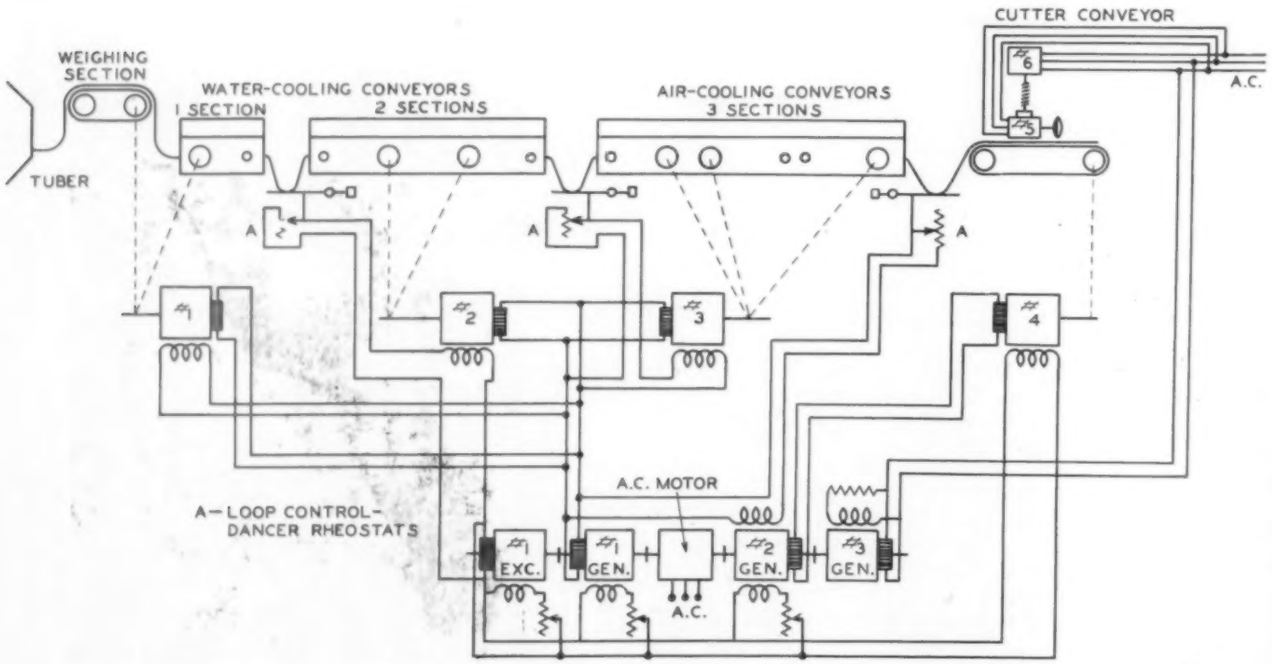
Rotating Electrical Equipment

A five-unit motor-generator set, driven by a 20-horsepower squirrel-cage induction motor, supplies variable-voltage direct current for the operation of the conveyor motors and constant-voltage direct current for excitation of the various generators and motors and for direct-current braking on the a-c cutter feed or traverse motor. The weighing conveyor and cooling conveyors are driven by 3-horsepower, 230-volt, 1150-r.p.m., shunt-wound motors. The No. 1 motor drives the weighing conveyor, the approach conveyor, and the first section of the water cooling conveyors. The No. 2 conveyor motor drives the last two sections of the water cooling conveyors, while No. 3 motor drives the three air cooling sections.

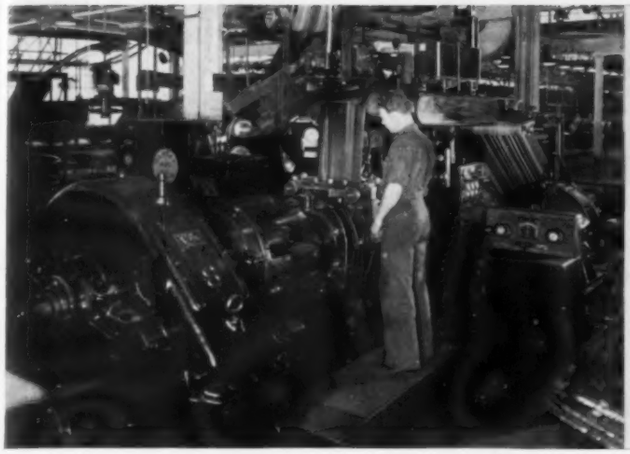
The various motors are coupled to speed reducers from which the various conveyor sections are driven by chains. By proper choice of sprocket ratios on these chain drives it is possible to obtain approximately the correct speed on each conveyor to compensate for the contraction of the rubber tread as it is cooled. Although approximate compensation is obtained by the chain ratios, the final or accurate compensation for shrinkage and control of the loop between the various conveyors is obtained by means of a dancer rheostat operated by the loop between the conveyor sections. By this means the variation in the length or position of the loop is utilized to vary the speed of the motor driving the next section and thus maintain the position of the loop at all times.

The three conveyor motors obtain their power from No. 1 variable-voltage generator which is rated 10 kw at 250 volts. These three motors and the generator are separately excited from the 1½-kw, 250-volt, flat-compound-wound exciter, also a part of the motor-generator set.

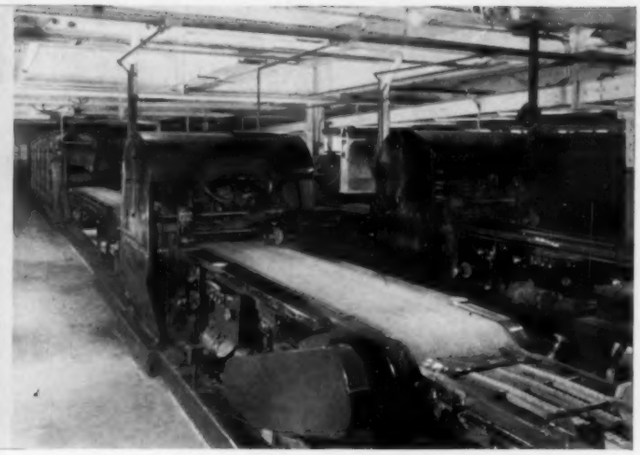
The cut-off section of the conveyor system is driven by a 2-horsepower, 230-volt, 690-r.p.m., shunt-wound separately excited motor, the slower speed being chosen on account of the frequent and rapid starting and stopping required on this cut-off conveyor. The shunt field of this motor is excited from the constant-voltage exciter, while the armature or power is supplied from a 2-kw, 250-volt generator No. 2 on the motor-generator



The method of producing Ford tire treads is shown schematically in this diagram.



The complete tire surface, including tread and sidewall, is extruded as shown by the vertical sheet directly in front of the operator from the tuber, located at left.



The tread enters the water and cooling conveyors at extreme left and from these it passes onto the cut-off conveyor which is seen in the center of the photograph.

set. A separate generator is supplied for this motor so that its operation will not affect the remainder of the system, also by so doing it is possible to design the generator to give the high rates of acceleration and deceleration required on the cutter conveyor with a minimum of control.

Running continuously, the cutter wheel is driven by a 1½-horsepower, 1725-r.p.m. squirrel-cage induction motor. The traverse motor operating the screw feed of the cutter is a special 3-horsepower, 900-r.p.m. squirrel-cage induction motor. Traverse motion is started when the conveyor is stopped, and at the completion of the traverse cycle, that is, the return to the normal position, the motor is stopped by application of direct-current braking.

Controlling the System

Control equipment for the complete conveyor system, that is, all motors and generators, is of floor-mounted cubicle construction having hinged double doors on the top half of the front side and a removable back. Combination linestarters are provided for each of the a-c motors and are mounted in separate sheet steel enclosures on the lower half of the panel. Circuit breakers, which are a part of each of these linestarters, are externally operated and mechanically interlocked with their respective doors. Overload relays are provided for all motors, those for the a-c motors being part of the linestarters, while the d-c overload relays and other contactors for the variable-voltage drive are mounted on the ebony asbestos panel in the main cabinet. All of the d-c overload relays are connected in series and operate to stop the motor driving the motor-generator set. Field failure relays are also provided in the motor circuit so that in case of a failure from this source the conveyor system is shut down.

A master control station is installed near the tubing machines on which is a start-stop button for the motor-generator set, start-stop pushbuttons for the water and air cooling conveyors, a direct-current voltmeter, and a hand-operated field rheostat for controlling the voltage of the main 10-kw generator. Safety stop buttons are located at various points on the water cooling conveyor, the air cooling conveyor and cut-off conveyors.

This application is a good example of the operating possibilities with variable voltage drive, but for a combination of this type, that is, with some sections operating on a cycle duty, extensive calculations and special machines were involved to obtain the present satisfactory results.

Black-Out—New Coating Material

A NEW surface protective material for use on rubber, paper, metal and textile products in service or in storage, which prevents or retards ozone cracking and sun checking of rubber, has been introduced under the trade-name of "Black-Out" by the R. T. Vanderbilt Co., New York City. The new material is a pigmented coating, being a solid in a volatile solvent. On evaporation it leaves an adherent, flexible, non-tacky film which is highly resistant to ozone or sunlight cracking. It is a dark brown liquid and the film is a fairly good black, making it suitable for use on dark colored articles.

The concentration of Black-Out as supplied is such as to make it suitable for dipping or brushing. If it is to be applied by spraying, it is desirable to thin it somewhat, preferably with toluol. When spread over the surface of a cured rubber article, it penetrates slightly and on drying leaves a protective film of flexible material strongly adherent on the rubber surface. Because the film is quite flexible, it does not crack nor flake off when the rubber article is bent, flexed or twisted.

It is impractical to use the new coating material to surfaces which must withstand continued abrasion, such as tire treads, due to the fact that it has little if any resistance to abrasive action. The flexibility of the films, however, permits its use on tire sidewalls.

Electrically Conductive Rubber

New Technique Permits Production of Conductive Rubber Without Sacrificing Normal Properties of Flexibility and Resistance to Cracking or Wear

By H. E. ELDEN
Technical Manager,
Dunlop Tire & Rubber Corp.

THE characteristic properties of rubber, and its flexibility in particular, endow it with a versatility as an insulator which places it in a class apart from many alternative materials. Its appearance in the role of a semi-conductor now offers industry a new material, which is finding growing application in two distinct ways: either where a truly flexible and elastic conductor is required, or where the normal insulating properties of rubber are a disadvantage under particular circumstances.

It is true that rubber with some degree of electrical conductivity has been made in the past by heavily compounding the material with various ingredients, as, for example, powdered charcoal, graphite, or lamp black. In every such instance, however, conducting power has been obtained only at the expense of mechanical properties; the resulting rubbers have been hard and liable to crack easily, and in fact have been generally un-rubberlike. Moreover the electrical properties of such products at their best are found to be somewhat variable.

Mechanical Properties Retained

Within the last few years a new technique has been developed in the Dunlop laboratories which now permits the production of electrically conductive rubbers without sacrifice of the normal properties of flexibility and resistance to cracking or wear. Rubber with good mechanical properties is available with any required specific resistance between the limits of one ohm and 10^{15} ohms—the latter being the approximate specific resistance of pure rubber—and of a hardness which can be varied from that of ebonite to that of a medium-soft rubber. Within certain limits any degree of conductivity can be associated with any degree of hardness, with one reservation—that very soft rubbers cannot be made highly conductive. To illustrate this it can be said that rubber of the hardness used in a pneumatic tire tread can be made with a minimum resistance of about 30 ohms per cm^3., while the outer covering of a cable may have a minimum specific resistance of 10 ohms.

The temperature coefficient of resistance of conducting rubber can be varied and is normally negative. Material with a coefficient of 3 to 5 per cent decrease in resistance per 1° C. increase in temperature can be made. Conducting properties are temporarily destroyed if the material is soaked in a rubber swelling agent such as gasoline, but are restored on drying out. Distortion also produces a temporary partial loss of conductivity, depending in its extent upon the degree of distortion. For example, it has been found that stretching to the extent of 10 per cent halves the conductivity, the full value being ultimately regained when the rubber is allowed to rest.

Some Applications of Conductive Rubber

Conductive rubber has considerable potential use in high-voltage cables with the object of preventing the formation of ozone by eliminating the field set up in the surrounding air when ordinary non-conducting rubber is employed. It is being used extensively for airplane tires to effect the discharge of static electricity on landing, without the complications of trailing chains or wires. Dangers from fire or shock are thus avoided.

Static electricity is frequently generated on belts driving machinery and on certain belt conveyors, such as those used for handling grain. Generally speaking, static charges do not present appreciable danger and only upon rare occasions do they even cause any sort of inconvenience. The accumulation of static is, however, possible in an atmosphere containing dust of an inflammable or explosive nature held in suspension, or containing inflammable gases or vapors, and the presence of such static charges might, under certain conditions, easily lead to serious explosion or fire.

In other cases, too, static charges developed in the vicinity can cause considerable inconvenience or actually interfere with the satisfactory processing of the material being handled due to the creation of an induced charge on the material itself. As an example of this, the drawing of cotton fibres may be quoted. The use of electrically conducting rubbers for belting on such machinery has been found to eliminate completely the accumulation of these static charges and so to avoid the serious complications caused by electrical charges developing on the material passing through.

In another case, a rubber jacket used in a grinding operation was stretched over two rubber-covered rollers. Considerable discomfort was caused to the operators from static charges on the jacket. On replacing one of the rollers by a roller covered with electrically conductive rubber the trouble completely disappeared. Probably many conditions exist where a similar replacement would avoid discomfort and pos-

(Continued on page 316)

Particle Size and Shape of Colloidal Carbon as Revealed by the Electron Microscope

The following data on the application of Electron Microscopy to determine the size and shape of colloidal carbon is taken from a technical bulletin, issued as Volume II of "Columbian Colloidal Carbons," by the Columbian Carbon Company, New York. The results obtained with the Electron Microscope described indicate that the particle diameter of colloidal carbon black similar to Micronex, previously estimated to be 80 mμ by microscopic methods and 50-60 mμ by ultrafiltration and counting methods, requires further downward revision to about 30 mμ.—The Editor.

FOR more than twenty years technologists have been attempting to master the mystery of colloidal carbon-rubber reinforcement. The carbon black particle has been pictured at various times as a sphere, an oval or a burr, as feathery or filamentous. This wide divergence of technical opinion is due to the fact that the reinforcement bond between colloidal carbon and rubber is consummated in a colloidal world far below the resolving powers of optical microscopy.

Although the Electron Microscope, in various forms, has been in laboratory use for some time, a number of new models with definite improvements have appeared in recent years. Pioneering in the field of Electron Microscopy has been Professor E. F. Burton, Head of the Department of Physics and Director of the McLennan Laboratory of the University of Toronto. Adapting one of the latest models built under Professor Burton's direction, W. B. Wiegand, Director of Development of the Columbian Carbon Company, and a group of his associates, began a series of studies on the size and shape of colloidal carbon particles, designed to clear up the reinforcement mystery. The accompanying report presents and analyzes the results of the first of this series of Electron Microscopic investigations.

For comparison of results with previous work on the size and shape of colloidal carbon particles a table giving a complete summary of all previous work is reproduced herewith. A composite picture of the carbon black particle, derived from the data given in the table, reveals the following: *Mean Particle Diameter:* 50-60 mμ; *Range:* 15-600 mμ; *Particle Shape:* no evidence and various conjectures; *Particle Surface:* no evidence and various conjectures; *Molecular Structure:* some crystalline habit indicated; *Size of Ultimate "Crystal" Habit:* 1-5 mμ *Type of "Crystal" Habit:* Graphitic.

Electron Microscope Method

Historical

Modern physics has shown that a beam of light, which is ordinarily described as an electromagnetic wave train, must also be regarded as a stream of discrete units of energy, called photons, in order to explain, for example, the action of the photo-electric cell. It has also been shown that a stream of electrons has certain of the characteristics of a wave train. If electrons are accelerated to a high speed by an electric potential difference of, say, 45,000 volts, they will behave in many respects as a train of waves with a wave length of the order of 1/20 Å which is many times smaller than the wave length of visible light included in the range 4000 to 7000 Å.

The discovery of an electron lens by Busch *(71)* gave impetus to the idea of utilizing the short wave length characteristics of an electron beam in a super-microscope.

From this fundamental discovery, several types of electron microscopes have been developed. One of the simpler types produces an enlarged image of the cathode surface, thereby making it possible to study the source of the electrons. This has proved most useful in electron tube manufacture. With a photo-electric cathode, the device has revolutionized television. Another type of electron microscope is based on the principles of a light microscope. A high-speed

SUMMARY OF PREVIOUS RESULTS OF PARTICLE SIZE AND SHAPE FOR MICRONEX OR EQUIVALENT GRADE OF CARBON BLACK

Method	Particle Diameter mμ (Footnote 1)	Particle Shape or Structure (Footnote 2)	Investigator	Year
Microscopy	80	Spherical (assumed)	Wiegand (1), Gartrell (2)	1920
" (?)	<100	Spherical with feathery surface	North (3)	1922
"	100–200–600	Generally spherical with serrated surface	Spear (4)	1923
"	150		Green (11)	1923
"	<80		Barnard for Wiegand (12)	1927
Ultramicroscopy		Oval	Thiessen (4)	1923
"		Anisotropic	Goodwin and Park (14)	1928
"	15–200	Isotropic and anisotropic	Grenquist (15)	1929
"	<50–200		Parkinson (16)	1930
Count	83, 106, 124		Peterfi for Wegelin (17)	1927
"	50–60		Barnard for Wiegand (12)	1927
"	50		Peterfi for Hartner (18)	1930
"	61		Gehman and Morris (19)	1932
X-ray		Finely divided graphite	Debye and Scherrer (20)	1917
"		Finely divided graphite	Asahara (21)	1922
"		Crystalline and amorphous mixture	Pickles (7)	1926
"		Continuous amorphous to crystalline state	Clark (23)	1926
"		Elementary crystalline structure (paracrystalline)	Clark (24)	1932
"		Amorphous to crystalline state	Goodwin and Park (14)	1928
"		Amorphous to crystalline state	Grenquist (15)	1929
"		Amorphous	Raman (25)	1929
"		Mesomorphic to crystalline	Warren (26)	1934
"		Amorphous to crystalline	Randall and Rooksby (27)	1932
"	10 × 10 × 20 Å	Regularly formed crystals (crystallites)	Wilm and Hofmann (28)	1935
"	15.4 × 21.6 Å 15.9 × 18.9 Å	Ultimate crystallite units	Clark and Rhodes (29)	1940
Electron diffraction	30 Å	Ultimate crystal units	Morgan (38)	1932
" "	50 Å	" " "	Trendelenburg (39)	1932
" "	50 Å	" " "	Trillat (42)	1934
Settling	25 μ		Evers (43)	1927
" (Footnote 3)	10–20 mμ		Plauson Co. for Klein and Parrish (51)	1924
" (Footnote 4)	100 mμ		Columbian Labs. (69)	1927
Adhesion tension (Footnote 5)	45–68 mμ		Gehman and Morris (19)	1932
Rubber structure		Isotropic	Vogt and Evans (65)	1923
" "		Anisotropic	Goodwin and Park (14)	1928
" "		Anisotropic	Columbian Labs. (70)	

NOTES: (1) Particle Diameter refers to crystal unit and not geometrical unit in case of X-ray and electron diffraction results.
(2) Structure (molecular) given by X-ray and electron diffraction results.
(3) These low values by Plauson Co. undoubtedly conjectures.
(4) Gravitational settling by imposition of an electrical velocity.
(5) Calculated from pore radii data.

Professor E. F. Burton, left, and A. Prebus, right, with the Electron Microscope.

electron beam replaces the beam of light. The axially symmetrical magnetic field of a solenoid takes the place of a lens. The specimen is viewed by means of the electrons which are transmitted through it.

Knoll and Ruska in 1932 *(72, 73)* and Ruska in 1934 *(74, 75)* described the development of a two-stage microscope of the general type now in use. In 1934, Marton *(76, 77)*, while in Belgium, reported work with a similar instrument. He is credited with the first attempt to examine biological specimens. A third instrument *(78, 79)* built in England, while similar in design, was limited in resolving power and magnification.

Later with the help of von Borries and Ruska *(80)*, the Siemens and Halske A.-G. built a new instrument designed for speed and convenience of manipulation. It was of the basic design described by Ruska in 1934.

Under the direction of Professor E. F. Burton of the Department of Physics of the University of Toronto, and with the assistance of Dr. W. H. Kohl, C. E. Hall, a graduate student in the department, beginning September, 1935, carried out the construction of both an electrostatic and electromagnetic type of electron microscope capable of giving magnified views of the cathode surface.

In 1938, A. Prebus and J. Hillier *(81)* constructed a two-stage electron microscope for the examination of a great variety of objects. With this instrument it has been possible to photograph detail finer than 10 mμ at magnifications as high as 30,000 diameters. In general, however, it has proved more practical to work at 10,000 to 15,000 diameters and then to enlarge optically an additional two to four times.

The number of contributors to the theory and practice of electron microscopy and electron optics in general is increasing *(82 to 91)*. Up to the present the major object of their work has been the development of the microscope itself into a reliable instrument. Already some important revelations *(95 to 99)* regarding the size and structure of bacteria and filtrable viruses have been made.

In 1938, there was published *(100)* an electron photomicrograph of the soot deposited on a silver screen passed rapidly through a candle flame. This screen constituted the object holder of the microscope. For this soot there was claimed a structure described as "a combination of small hexagonal scales." These were of the order of 50 mμ in size.

In the production of commercial carbon black by the impingement process the collecting surface is drawn slowly through a succession of flames. Since the quality of the colloidal carbon produced is influenced by the size and shape of the flame, the position of the collecting surface in the flame, the degree of smothering of the flame and by the composition of the hydrocarbon which is burned, the soot described above cannot be considered as a specimen of true carbon black.

Description of Apparatus and Operating Technique

The principles of construction of the magnetic electron microscope are similar to those of a high power light microscope. This is illustrated by the diagrammatic cross section shown in Figure 1. The object is "illuminated" by a beam of electrons which are emitted from the cathode and accelerated to a high velocity. The electron beam may be concentrated by means of a magnetic condenser lens, this serving the same

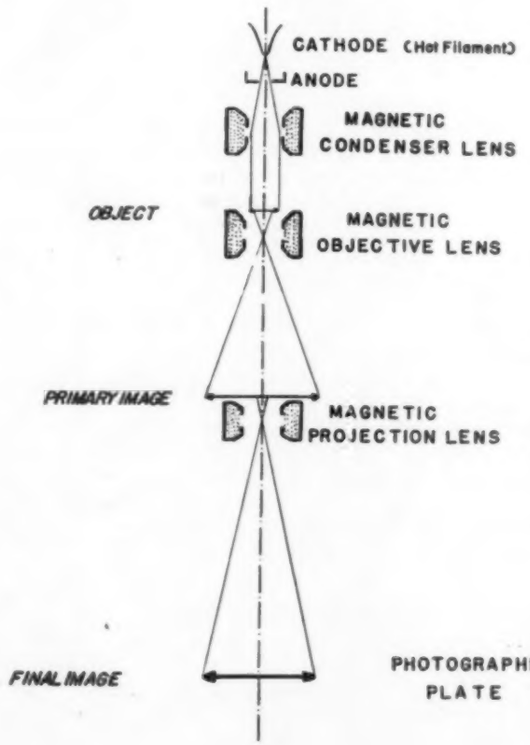


FIG. 1

purpose as the substage condenser of the light microscope.

The electrons passing through and around the object are focused by the magnetic field of the second solenoid in an image plane at about 100 diameters magnification. Following the analogy of the light microscope, the second solenoid is called an objective lens. The primary image must be magnified further by the projector lens in order to render the finer detail visible to the eye.

Factors Affecting Resolution

The entire system of electron lenses, source of illumination, object and camera requires to be maintained in a vacuum of the order of 10^{-4} to 10^{-5} mm. Hg in order that electrons will not be scattered or retarded by molecules of gas, thereby destroying the definition in the image.

The accelerating potential of the electron beam must be maintained constant to a high order of precision (c. 1 volt in 50,000) in order that all electrons shall have the same velocity. Variation in the velocities of the electrons results in a serious loss of detail in the images, an effect which is analogous to chromatic aberration.

For the same reason, the currents controlling the magnetic field strengths in the solenoids must also be maintained at constant values during a photographic exposure. Otherwise drifts of the image occur during exposure.

The resolving power of the microscope also depends on the specimen under examination. For example, in traversing even the thinnest microtome section (c. 1 μ) the velocities of the primary electrons are scattered over such a wide range that the chromatic error reduces the resolving power to a value comparable with the resolving power of a light microscope. The full resolving power of the super-microscope can be exploited only in the examination of very thin objects (c. 100-500 Å).

Too much delay in adjustment of the instrument after a specimen has been inserted may result in a thickening of the film due to the electron bombardment, or even to its destruction due to excessive heating.

Magnification

Because of the magnitude and wide range of magnification attainable with a given lens combination, the customary methods of calibration are not applicable.

Assuming a hypothetical case where the object distances of both the objective and projector lenses are 5 mm. and the image distances 50 cm., the magnification will be × 100 per lens or × 10,000 for the microscope. If by adjustment of the objective lens strength the primary image is moved to 2.5 mm. from the projector lens, the primary magnification will be $\frac{502.5}{5.0}$ = × 100.5, *i.e.*, increased ½%. But the object distance for the projector has been halved so that the secondary magnification is $\frac{500}{2.5}$ = × 200 or a total magnification of c. × 20,100.

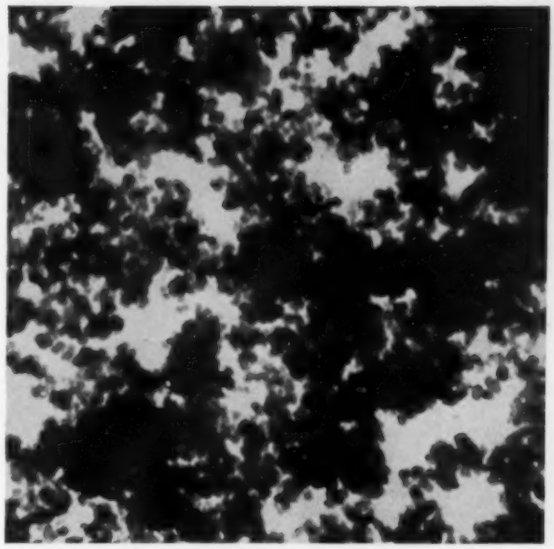


PLATE 362 (× 32,400)

Mounting	Dry
Original Magnification	× 11,900
Mean Particle Diameter	28.9 mμ

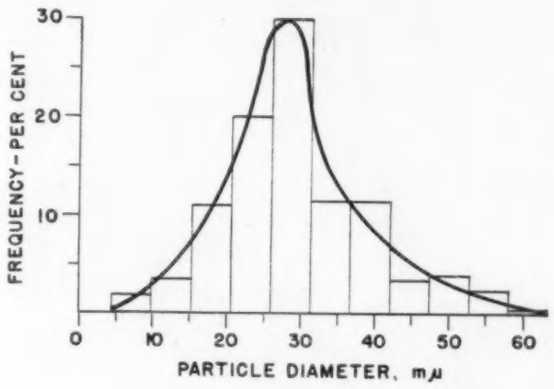


FIG. 2

PLATE 362

Mean Particle Diameter	28.9 mμ
Modal Particle Diameter	c. 28.0 mμ
σ	10.1 mμ
Skewness, k *	+0.50
No. of Particles Measured	166

$$* k = \frac{\Sigma^{N}(X_i - X)^3}{N\sigma^3}$$

The primary magnification of a given electron microscope is therefore fixed by its dimensions within rather close limits, but the secondary magnification being highly sensitive to primary image position must be carefully calibrated, preferably for each photograph. This is done by moving the object laterally relative to the objective lens a measured distance and determining the corresponding primary image shift. A similar procedure is followed for the second stage magnification. From these observations the total magnification is determined, *e.g.*, for Plate 362.

CALCULATION OF MAGNIFICATION AND MAXIMUM ERROR

Plate 362

First Stage

Object Movement	0.002 " ± 0.000125"	or ±	6.2%
Image Shift	0.25 " ± 0.02"	or ±	8.0%

$$\text{Primary Magnification} = \frac{0.25}{0.002} = \times 125 \qquad \pm 15.2\%$$

Second Stage

Primary Image Movement	0.0105" ± 0.0005"	or ±	2.4%
Final Image Shift	1.00" ± 0.06"	or ±	6.0%

$$\text{Secondary Magnification} = \frac{1.00}{0.0105} = \times 93.5 \qquad \pm 8.6\%$$

Total Magnification = 125 × 93.5 = × 11,900 ± 25.2%

NOTE: The value 25.2% represents maximum possible error in final magnification based on one reading and not the probable error statistically derived from a series of observations. In the case of the plates in this study all readings were taken in duplicate. The total magnifications shown are therefore deemed to be accurate to within 10-20% for each plate.

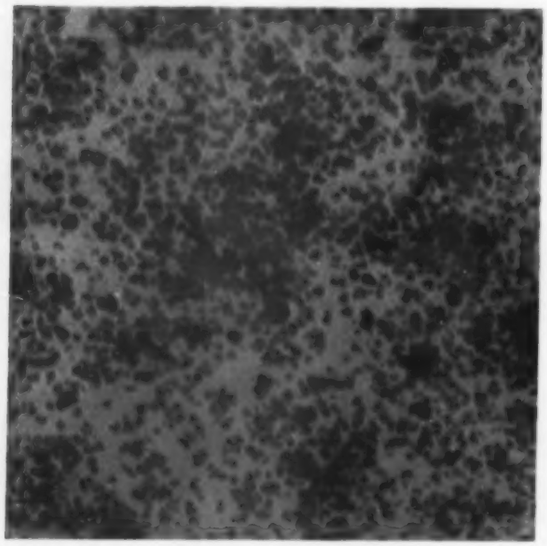


PLATE 377 (× 27,300)

Mounting	Wet
Original Magnification	× 9200
Mean Particle Diameter	28.3 mμ

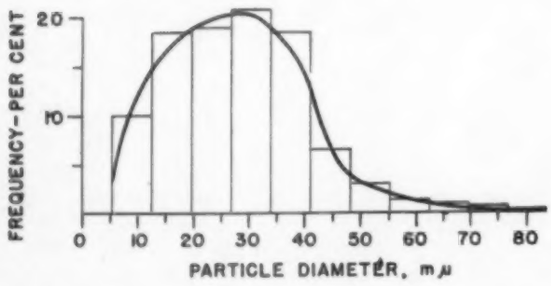


FIG. 3

PLATE 377

Mean Particle Diameter	28.3 mμ
Modal Particle Diameter	c. 26.0 mμ
σ	13.2 mμ
Skewness, k	+0.91
No. of Particles Measured	385

Particle Size and Shape of Micronex Colloidal Carbon

Experimental Results

Micronex carbon black was used exclusively in this first study on the electron microscopy of colloidal carbon, as being perhaps the most representative of the channel or impingement types of carbon black made from natural gas. Its most important use is in the rubber industry, where, due to reinforcing action, it imparts strength and wearing qualities to rubber. The chemical properties of the Micronex carbon used in these studies are:

D. P. G. Adsorption *(101)*	12.1%
Volatile *(102)*	6.0%
pH *(103)*	4.2

Electron photomicrographs were secured on Micronex carbon in its original "dry" form and in the dispersed or "wet" form. The film specimens of dry carbon black were prepared for the electron microscope by dusting the dry carbon over a precast film of collodion of about 150 Å thickness. Two photomicrographs of dry Micronex carbon black are shown in Plates 362 and 351, which are enlargements from the original negatives.

The "wet" specimens of Micronex carbon were prepared from a nitrocellulose dispersion, in which a high order of particulate dispersion was obtained by a special method. The nitrocotton dispersion was then reduced to a suitable concentration for casting the specimen films. In these films the particles of carbon are substantially in one plane and are sufficiently separated to be distinguishable as individuals. The thickness of the inter-particle supporting nitrocellulose film is of the order of 150 Å. Plates 377 and 392 show two photomicrographs of dispersed Micronex which are enlargements from the original negatives.

The procedure followed in the particle size determinations was identical for the four plates. A contact lantern slide was prepared from the negative of the photomicrograph and then projected at a determined magnification on a screen. All discrete and clearly defined particles, and only such, were measured. Histograms of these measurements were prepared in which the bars of the histogram were raised on cells comprising two units of measurement on the screen. A frequency distribution curve was superimposed on the histogram, with the abscissa scale converted to particle diameters in mμ. From the actual measurements and the frequency distribution curves values of the mean and modal particle diameters were obtained, as recorded in the table below and under Figures 2, 3, 4 and 5. Root mean square or standard deviation (σ) values for the means were determined together with the skewness coefficients.

Plates 362 and 377 reveal the best definition and particle size measurements from these photomicrographs deserve somewhat more weight than the values obtained from Plates 392 and 351. The results from the latter plates are included as offering confirmatory evidence.

The curves show some differences. The distinctive shape of the curve from Plate 377 (Figure 3) is ascribed to nearly complete deflocculation, the result being increased recognition as discrete individuals both of the smaller and the larger particles.

The Particle Size of Micronex Colloidal Carbon

The foregoing observations on Electron Photomicrographs are summarized below:

Plate No.	*Type of Mounting*	*Plate Magnification*	*Particles Counted*	*Diameter (mμ) Mean*	*Modal*
362	Dry	11900	166	28.9	28.0
377	Wet*	9200	385	28.3	26.0
351	Dry	12400	108	26.5	28.0
392	Wet*	12800	257	26.3	25.0
				Average = 27.5	

*Predispersed in nitrocotton.

NOTES: (1) Plates 362 and 377 warrant somewhat greater weighting in the calculation of the average particle diameter because of their greater resolution of detail. (2) The Micronex Colloidal Carbon used in this study gave a mean particle diameter of 28 mμ. (3) The Standard Deviation (σ) of the above determinations was c. 10 mμ.

Alternative Values for Mean Particle Diameter

The mean particle diameter values shown in the above table are based on the direct linear measurement of the particles in the photomicrographs. This "measured" mean does not necessarily agree with the diameter given by the count method and in fact will be smaller whenever a range of particle diameters is involved.

In the "count" method the total mass or volume of material is assumed to consist of particles of uniform diameter. A count method diameter for the 166 particles measured in Plate 362 can be calculated. The total volume of these particles divided by 166 gives the volume of a single uniform "count method" particle. For this uniform particle the diameter becomes 32.3 mμ, compared to the measured mean diameter of 28.9 mμ. Therefore, the diameter obtained by counting is shown to be greater than the mean diameter secured by measurement.

This relation between the counting method or mean volume diameter (D_v) and the measured mean diameter (X) can be determined algebraically by making the following assumptions:

(1) The particles are spheres.

(2) There is a symmetrical distribution of the particle diameters.

(3) The unit volume of material consists of N particles.

Let the mean measured diameter of the particle equal X. Then

$$\text{Total Volume of Pigment} = \frac{N\pi}{6}(X^3 + 3X\sigma^2) \quad (1)$$

$$\text{Average Volume per particle} = \frac{\pi}{6}(X^3 + 3X\sigma^2) \quad (2)$$

and from (2) the average diameter of these particles (D_v) is given by

$$D_v = (X^3 + 3X\sigma^2)^{1/3} \quad (3)$$

Applying the X and σ values from Plate 362 to equation (3), D_v becomes 32.1 mμ. This result is in substantial agreement with the value of 32.3 mμ obtained above by direct calculation, reflecting the approximate symmetry of the distribution curve for Plate 362.

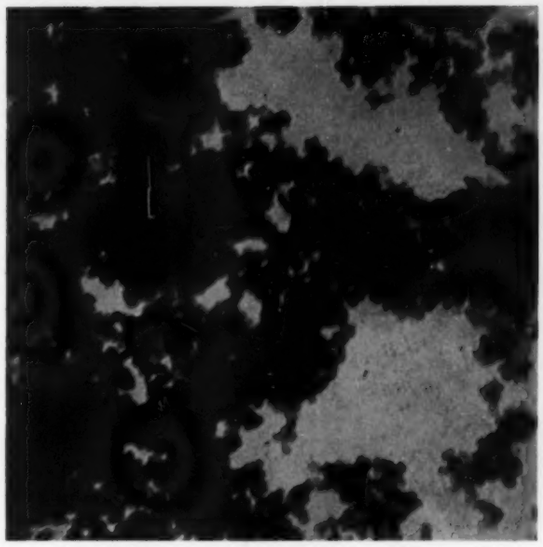


PLATE 351 (× 33,800)

Mounting	Dry
Original Magnification	× 12,400
Mean Particle Diameter	26.5 mμ

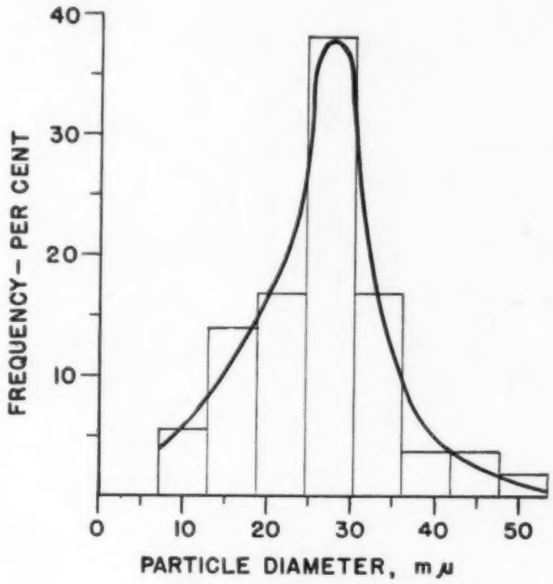


FIG. 4

PLATE 351

Mean Particle Diameter	26.5 mμ
Modal Particle Diameter	c. 28.0 mμ
σ	8.4 mμ
Skewness, k	+0.11
No. of Particles Measured	108

These alternative values based on Plate 362 are tabulated below.

	Average Particle Diameter (mμ) *By Direct Computation*	*From Equations*
By direct measurement (X)	28.9 (100%)	
By counting method (D_v)	32.3 (112%)	32.1 (111%)

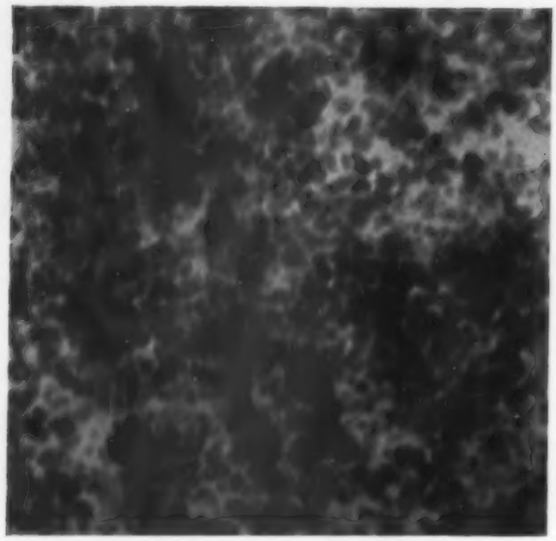


PLATE 392 (× 48,000)

Mounting	Wet
Original Magnification	× 12,800
Mean Particle Diameter	26.3 mμ

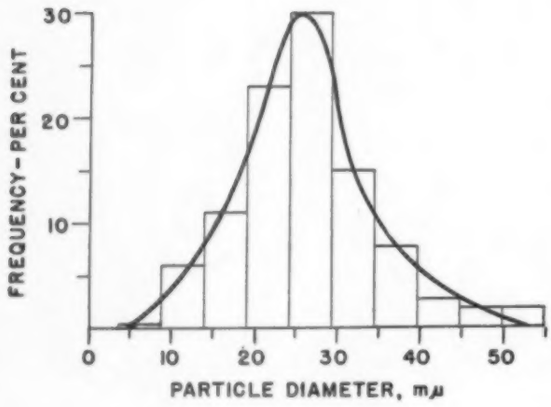


FIG. 5

PLATE 392

Mean Particle Diameter	26.3 mμ
Modal Particle Diameter	c. 25.0 mμ
σ	8.3 mμ
Skewness, k	+0.63
No. of Particles Measured	257

The difference between the "computed" and the "equation" values will depend on the asymmetry of the distribution curve. The spread between X and D_v on the other hand will depend on the width (σ) of the distribution curve. This difference between the measured X and the calculated D_v, for the four plates, is revealed by the following tabulation:

Average Particle Diameter (mμ) for Plates

	362	377	351	392
X	28.9(100%)	28.3(100%)	26.5(100%)	26.3(100%)
D_v	32.1(111%)	33.5(118%)	28.9(109%)	28.7(109%)

The greatest divergence of D_v from X occurs for Plate 377 which shows the widest distribution curve. The other three plates reveal approximately the same degree of divergence.

In summary, the diameter (D_v) obtained by the count method is greater than the mean measured diameter (X), the extent of this difference depending on the range of size distribution. In the limiting case where σ becomes zero, D_v equals X.

Alternative Values for Specific Surface

In the case of colloidal pigments such as carbon black a knowledge of particle surface development is desirable in order to evaluate adsorptive or reinforcement phenomena. The values for total surface per unit weight will depend on the method by which the particle diameter has been obtained.

The true specific surface for the unit volume represented by N particles is obtained by addition of the surface areas for all of the individual particles measured. For Plate 362, the value thus obtained for the 166 particles measured will be represented as 100%.

The true specific surface (S_T) can also be calculated from the equation

$$S_T = N\pi\ (X^2 + \sigma^2) \qquad (4)$$

Inserting the values for N, X and σ from Plate 362 in this equation, the same value for S_T (100%) is obtained.

The specific surface calculated from D_v, the "count method" diameter, is greater than the true specific surface. In this calculation the number of particles and their total mass (or volume) are the same as in the true specific surface calculation, but the particles are assumed to be of uniform size.

Taking the D_v value computed directly from the data for Plate 362, the specific surface becomes 112% compared to the value of 100% obtained for S_T, the true specific surface.

From equation (3) the specific surface can also be calculated from D_v as follows:

$$S_{Dv} = N\pi\ (X^3 + 3X\sigma^2)^{2/3} \qquad (5)$$

Using X and σ values from Plate 362 the value for S_{Dv} becomes 110%, compared to 112% obtained by direct computation. This difference is ascribed to the lack of complete symmetry in the distribution curve.

The specific surface calculated from X, the measured mean diameter, is also greater than the true specific surface. In this calculation it is first necessary to compute the number of particles of diameter X required to give the same unit mass (or volume) used in the S_T and S_{Dv} calculations above.

Taking the X value for Plate 362, and the total volume of the 166 particles measured, the specific surface is computed as 126% compared to the value of 100% obtained for the true specific surface.

The specific surface can also be calculated from the equation

$$S_X = N\pi(X^2 + 3\sigma^2) \qquad (6)$$

Substituting the N, X, and σ values from Plate 362 in this equation S_X becomes 122%, compared to 126% by direct computation. This difference is ascribed to the lack of complete symmetry in the distribution curve.

In the limiting case where σ becomes zero, equations (4), (5) and (6) reduce to the common form

$$S = N\pi X^2 \qquad (7)$$

and all of the specific surface values become identical.

The alternative percentage results based on Plate 362 are tabulated below.

	Specific Surface	
	By Direct Computation	*From Equations*
By summation (S_T)	100%	100%
From D_v (S_{Dv})	112%	110%
From X (S_X)	126%	122%

The difference between the "computed" and the "equation" values depends on the asymmetry of the distribution curve. The spread between S_{Dv} or S_X and S_T depends on the width (σ) of the distribution curve. This divergence for the four plates is revealed by the following tabulation of values calculated from the equations:

SPECIFIC SURFACE FOR PLATES

	362	377	351	392
S_T	100%	100%	100%	100%
S_{Dv}	110%	115%	108%	109%
S_X	122%	136%	118%	118%

The greatest divergence of S_{Dv} and S_X from S_T occurs for Plate 377, which shows the widest distribution curve. The other three plates show approximately the same degree of divergence.

These percentage results are based on the volume represented by the number of measured particles for each plate. For general use it is more desirable to express specific surface results in quantitative units. The true specific surface, in square inches per inch cube, can be calculated for any pigment from the measured mean diameter (X) and σ by equation (8), derived from equations (1) and (4), where X and σ are expressed in inches.

$$\text{True Specific Surface} = \frac{6(X^2 + \sigma^2)}{(X^3 + 3X\sigma^2)} \qquad (8)$$

The true specific surface values, calculated from equation (8), are set forth below for the four plates studied:

Plate No.	X in.	σ in.	Specific Surface sq. in./cu. in.
362	11.4×10^{-7}	4.0×10^{-7}	4320000
377	11.1×10^{-7}	5.2×10^{-7}	4000000
351	10.4×10^{-7}	3.3×10^{-7}	4880000
392	10.4×10^{-7}	3.3×10^{-7}	4900000

It should be pointed out that in all of the calculations involving D_v it is assumed that the count method would identify all of the particles. Actually this is unlikely, since some of the smaller particles might be missed. In this event an experimental count method would tend to give larger D_v, and therefore smaller S_{Dv} values, than those above.

In summary, the specific surface, that is surface area per unit weight of carbon, based on the results of this study, is about 10% greater than the true value when calculated from the "counting method" diameter (D_v) and about 24% higher when derived from the measured diameter (X).

General Summary and Conclusions

(1). The particle diameter of Micronex colloidal carbon black originally estimated to be 80 mμ by microscopic methods, later as 50-60 mμ by ultrafiltration and counting methods, now appears, on the evidence of direct measurements with the electron microscope, to require further downward revision to about 30 mμ.

(2). The original estimate of specific surface of 1,900,000 square inches per cubic inch based on 80 mμ, and that of 2,500,000 corresponding to 60 mμ, would now appear to require upward revision to the value of about 5,000,000. Effects ascribable to the high specific surface of colloidal carbon do not require nor in fact permit the assumption of burr or feather-like surface configurations, but may now be attributed to fineness of subdivision alone.

(3). The preponderating geometrical form of the ultimate particles of colloidal carbon is spheroidal with some evidence of plane surfaces, the general conclusion being that the particles may be treated as sensibly isotropic.

(4). The establishment by direct observation of a much lower ultimate particle size for carbon black suggests the possibility of more efficient employment of the total available carbon surface in reinforcement phenomena.

BIBLIOGRAPHY

(1) Wiegand, *Can. Chem. Journal,* June, 1920.
(2) Gartrell, Private communication.
(3) North, *India Rubber Journal,* **64,** 861 (1922).
(4) Spear, Colloid Symposium Monograph, Vol. 1, 321 (1923).
(7) Pickles, *Trans. I. R. I.,* **2,** 85-8 (1926).
(11) Green, *Chem. & Met. Eng.,* **28,** 53 (1923).
(12) Wiegand, *I. R. J.,* **73,** 31 (1927).
(14) Goodwin and Park, *Ind. Eng. Chem.,* **20,** 621 (1928).
(15) Grenquist, *ibid.,* **21,** 665, (1929)
(16) Parkinson, *Trans. I. R. I.,* **5,** 263 (1930).
(17) Wegelin, *Kautschuk,* **3,** 196 (1927).
(18) Hartner, *Rubber Chem. & Tech.,* **3,** 215 (1930).
(19) Gehman and Morris, *Ind. Eng. Chem., Anal. Ed.,* **4,** 157 (1932).
(20) Debye and Scherrer, *Phys. Z.,* **18,** 291 (1917).
(21) Asahara, *Japan J. Chem.,* **1,** 35 (1922).
(23) Clark, *Ind. Eng. Chem.,* **18,** 1131 (1926).
(24) Clark, "Applied X-Rays," p. 428 (1932).
(25) Raman, *Nature,* **123,** 945 (1929).
(26) Warren, *Journal Chem. Physics,* **2,** 551-5 (1934).
(27) Randall and Rooksby, *Nature,* **129,** 280 (1932).
(28) Wilm and Hofmann, *Kolloid-Z.,* **70,** 21-4 (1935).
(29) Clark and Rhodes, *Ind. Eng. Chem.,* **12,** 66, (1940).
(38) Mongan, *Helv. Phys. Acta,* **5,** 341-50 (1932).
(39) Trendelenburg, *Naturwissenschaften,* **20,** 655-6 (1932).
(42) Trillat, *Kolloid-Z.,* **69,** 378-89 (1934).
(43) Evers, *Kautschuk,* pages 70-7, Feb., 1927.
(51) Klein and Parrish, *J. Oil & Colour Chem. Assoc.,* **7,** 54 (1924).
(65) Vogt and Evans, *Ind. Eng. Chem.,* **15,** 1015 (1923).
(69) Columbian Research Laboratory, unpublished data.
(70) *Ibid.,* unpublished data.
(71) Busch, *Ann. Physik,* **81,** 974-93 (1926).
(72) Knoll and Ruska, *ibid.,* **12,** 607-40 (1932).
(73) Knoll and Ruska, *Z. Physik,* **78,** 318-39 (1932).
(74) Ruska, *ibid.,* **87,** 580-602 (1934).
(75) Ruska, *ibid.,* **89,** 90-128 (1934).
(76) Marton, *Nature,* **133,** 911 (1934).
(77) Marton, *Bull. acad. roy. Belg.,* **21,** 606-17 (1935).
(78) Martin, *Nature,* **142,** 1062-5 (1938).
(79) Martin, Whelpton and Parnum, *J. Sci. Instruments,* **14,** 14-24 (1937).
(80) Von Borries and Ruska, *Wiss. Veroffent. Siemens-Werken,* **17,** 99-106 (1938).
(81) Prebus and Hillier, *Can. Journal of Research,* **17,** 49-63 (April, 1939).
(82) Von Ardenne, *Z. Physik,* **108,** 338-52 (1938); **113,** 257 (1939).

(Continued on next page)

(83) *Ibid.*, **109**, 553-72 (1938).
(84) *Ibid.*, **111**, 152-7 (1938).
(85) Beischer and Krause, *Naturwissenschaften*, **25**, 825-9 (1937).
(86) Beischer and Krause, *Angew. Chem.*, **51**, 331-5 (1938).
(87) Krause, "Beitr. zur Elektronenoptik.," J. Barth., Leipzig (1937).
(88) Krause, *Naturwissenschaften*, **25**, 817-25 (1937).
(89) Krause, *Z. Physik*, **102**, 417-22 (1936).
(90) Zworykin and Morton, *Jour. Opt. Soc. Am.*, **26**, No. 4, 181-9 (1936).
(91) Epstein, *Proc. I. R. E.*, **24**, No. 8, 1095-1139 (1936).
(92) McMillen and Scott, *Rev. Sci. Instr.*, **8**, No. 8, 228-90 (1937).
(93) Marton, *Physica*, **3**, 959-67 (1934).
(94) Marton, *Phys. Rev.*, **56**, 290 (1939).
(95) Krause, *Naturwissenschaften*, **26**, 122 (1938).
(96) Müller, *Electrotech. Z.*, **59**, 1189-94 (1938).
(97) Von Borries and Ruska, *Z. Tech. Physik*, **19**, 402-7 (1938).
(98) Burton, Hillier and Prebus, *Can. Med. Assoc.*, **42**, 116-19 (1940).
(99) H. Ruska, von Borries and E. Ruska, "Archiv. fur die gesamte Virus forschung," Band Heft **1**, p. 155 (1939).
(100) "Electronics," pp. 30-3, Nov., 1938.
(101) "Columbian Colloidal Carbons," p. 175, 1938.
(102) *Ibid.*, p. 156, 1938.
(103) *Ibid.*, p. 180, 1938.

Lock-Air Tire Compound

AN entirely new type of tire compound which is applied inside the tube to form a thick, air-tight film over the inside area of the tube is Lock-Air, a product of the Lockair Co., Inc., 29 East 2nd St., Mineola, N. Y. The new compound is said to stop porosity leaks by sealing-in air pressure and to stop puncture leaks by sealing the puncture the instant it occurs, thus preventing the usual damage whch would ordinarily result from riding on under-inflated tires. According to the manufacturer, Lock-Air, which is inserted in the tire when in deflated position, keeps tubes live and pliable long beyond normal expectancy since its base ingredient is a rubber preservative. Tires in which the compound has been inserted will run from 20 to 30% cooler in hot weather or in hot climates. Daily check-ups on air pressure and tread can be reduced to monthly check-ups by fleet operators and others according to the company.

Kelite—New Mold Cleaner

A NEW cleaner that is said to remove carbon, dirt and other foreign matter from molds made of steel, iron, aluminum, or chrome plate has recently been introduced to rubber manufacturers under the name of Kelite Matrix Cleaner by the L. J. White Company, 315 West Hubbard Street, Chicago, Ill.

Kelite was originally developed for use of tire retreaders and repair shops but its effectiveness in cleaning tire molds soon led to its use in rubber factories, according to its manufacturer. It is said this material will not harm or attack the finish of the metal, leaving it clean after an immersion of from 12 to 48 hours followed by a rinse with water.

The cleaner is in fluid form and can be used as received, requiring no mixing, heating or dilution. It can be used repeatedly and is said to be non-inflammable and non-explosive.

Electrically Conductive Rubber

(Continued from page 308)

sibly danger to the operator, apart from the question of accidental ignition of inflammable material through the occurrence of sparks.

Preventing Explosions

The frictional effect of walking on rubber floors, or on linoleum, will generate static electricity in dry atmosphere. In hospital operating rooms, a spark from a static discharge may ignite ether vapor or other anaesthetic mixtures with serious or even fatal results, and the movement of blankets and sheets can generate a static charge with similar effects. A like danger can arise from the ignition of powders or dusts in explosive or other industries. These perils are removed by the provision of conducting rubber floors or mats. Such floors need not be specifically grounded at any point since their function is to eliminate differences of potential rather than to ground the whole system.

In practice the capacity to ground of a floor will be so large that the potential difference to ground set up by normal generation of static will be small. Even so, there will be sufficient leakage through ordinary jointing to keep the whole substantially at ground potential. On the other hand, there is no difficulty in positively grounding conductive floors or mats if specifically required.

All articles made of conducting rubber should be marked to that effect with permanent lettering. It is not safe, however, to assume that all unmarked rubber goods are fully insulating, since certain industrial rubber articles are at times found to possess some degree of electrical conductivity.

Flextite R-82

ONE of the so-termed compounded rubber dispersions made by the Flextite Corp., 6017 Northwest Highway, Chicago, Ill., is Flextite R-82. According to Stanley W. Campbell, director of research, Chase Bag Co., St. Louis, Mo., one of the leading users of the material, it resembles latex, being white, of medium low viscosity, and has an ammonia odor. The solids content runs to approximately 48.5%, while the pH is about 9.9 which is comparable to centrifuged latex. Films of Flextite R-82 are opaque and whitish. While weaker than latex films, their elasticity and strength indicate a similarity, according to Mr. Campbell. The material can be compounded with results similarly produced in latex compounding practices. Flextite R-82 can be used as a spray coating for automotive parts in transit, as a non-skid coating and size for rugs, and as an impregnator for papers and fabrics, among many other uses.

Adaptable to grinding practically any straight knife, including those with beveled edges, the **Precision Knife Grinding Machine** has been developed by the Seybold Division, Harris-Seybold-Potter Co., Dayton, Ohio. A unique feature is a hollow three-sided knife bar, each surface presenting a different series of angles to the action of the traveling grinding wheel.

Rubber Division Meets In Detroit September 12 and 13

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Commandery Asylum of the Masonic Temple
Detroit, Mich.—September 12-13, 1940

Thursday—September 12

Symposium: "Rubber, Synthetics and Plastics in the Automotive Industry as Viewed by the Engineer and Chemist."

Special Paper: "Butyl Rubber—A New Hydrocarbon Product," by Dr. Per K. Frolich (Standard Oil Development Co.).

Report of the Crude Rubber Committee.

Thursday Evening—September 12

Banquet: Book-Cadillac Hotel; address by W. J. Cameron (Ford Motor Co.).

Friday—September 13

Technical Session: 14 general papers.
Business Meeting.

AN ambitious program has been scheduled for the meeting of the Rubber Division, A.C.S., to be held in Detroit, Michigan, on Thursday and Friday, September 12 and 13, in conjunction with Convention One Hundred of the Society. It includes the presentation of fourteen general papers, a symposium on automotive rubber, a special paper on butyl rubber, a report of the Crude Rubber Committee, the business meeting, and the usual banquet. Headquarters of the Rubber Division will be the Book-Cadillac Hotel, but all technical sessions will be held at the Commandery Asylum of the Masonic Temple.

The symposium, which was arranged by the Detroit Rubber Group, is entitled, "Rubber, Synthetics and Plastics in the Automotive Industry as Viewed by the Engineer and the Chemist." Six papers in all will be given, as follows:

The Use of Rubber in the Automotive Industry from the Viewpoint of the Automotive Engineer, by C. Smart and G. W. Lampman (General Motors); *The Use of Rubber in the Automotive Industry from the Viewpoint of the Rubber Technologist,* by S. M. Cadwell (U. S. Rubber); *The Standardization and Coordination of Automotive Rubber Parts Specifications,* by L. A. Danse (Cadillac Motors); *The Use of Synthetic Rubber in the Automotive Industry from the Viewpoint of the Automotive Engineer,* by J. C. Zeder (Chrysler Corp.); *The Use of Synthetic Rubber in the Automotive Industry from the Viewpoint of the Rubber Technologist,* by J. N. Street (Firestone); *The Use of Plastics in the Automotive Industry,* by W. M. Phillips (General Motors Research). These are the titles assigned by the sponsors of the symposium. The actual titles, however, will differ slightly. The symposium will be held on Thursday, September 12.

A paper on "Butyl Rubber—A New Hydrocarbon Product" will be delivered by Dr. Per K. Frolich, Director, Chemical Laboratories, Standard Oil Development Co., Linden, N. J., before the general meeting of the Society on Wednesday, September 11. This paper will be the first one ever presented which will reveal the chemical and physical properties and characteristics of Standard Oil's new butyl rubber. It will be repeated before the members of the Rubber Division at its Thursday afternoon, September 12, session. A report from the Division's Crude Rubber Committee will also be given at the Thursday afternoon session. The banquet will be held at the Book-Cadillac Hotel on Thursday night. In addition to an address by W. J. Cameron, executive vice-president of the Ford Motor Co., there will be a program of music and variety acts between courses.

All of the general papers will be presented on Friday, September 13. The business meeting will be held on Friday afternoon, shortly after the presentation of the final technical paper. Abstracts of all of the fourteen general papers, and two of the six papers scheduled for the symposium on automotive rubber, together with the names and company connections of the authors, follow herewith.

ABSTRACTS OF PAPERS

Transparency of Rubber Compounds Containing Magnesium Carbonate. II. ***W. F. Bixby and H. I. Cramer (University of Akron, Akron, Ohio).***

Previous x-ray data has indicated that magnesium carbonates which maintain transparency when used as fillers in vulcanized rubber samples are the basic compound, $5MgO.4CO_2.xH_2O$. A systematic program of quantitative analysis of several samples of domestic and foreign origin has been carried out to verify this theory. The results show that both domestic and foreign samples maintaining high transparency are exceedingly pure $5MgO.4CO_2.xH_2O$.

Samples which, when compounded into rubber, result in inferior light transmitting sheets consist of mixtures of this basic compound and the normal magnesium carbonate, $MgCO_3$. Even small percentages of the normal carbonate will cause a considerable reduction in light transmission due to its exceedingly unfavorable refractive index. If, on the other hand, a $5MgO.4CO_2.xH_2O$ carbonate is employed containing a small percentage of hydrated magnesium hydroxide, $MgO.xH_2O$, the transparency is less affected because its refractive index is not as widely different from that of rubber.

Particle size of the carbonate becomes an important factor in maintaining transparency when basic magnesium carbonates

containing some of the normal carbonate are employed. In the particle size range encountered in commercial samples smaller particle size of the normal carbonate will provide greater surface from which undesirable reflection and refraction may take place, thereby lowering the light transmission of the rubber sheet.

A Study of the Nitroparaffins and Their Derivatives as Heat Sensitizers for Compounded Rubber Latices. ***Arthur William Campbell (Commercial Solvents Corp., Terre Haute, Indiana).***

When rubber latices containing a small amount of zinc ions are treated with a nitroparaffin, a halonitroparaffin, or hydroxynitroparaffin and heated, a rapid gelling results. Many nitroparaffins and derivatives, recently made commercially available, have been tested. Apparently all nitroparaffins and their derivatives in which the nitro group is unchanged are heat sensitizers.

Nitroethane and 2-nitro-2-methyl-1-propanol are the preferred examples. Latices sensitized with either of these agents are potentially very useful in latex technology, such as dipped goods, molded goods, and foams. The use of these heat sensitizing agents is not limited to rubber latices, but may be used in neoprene latex, crude rubber and reclaimed rubber dispersions.

Nitroethane is fugitive, being readily volatile, while 2-nitro-2-methyl-1-propanol is very water-soluble and thus readily washed out of the rubber composition. Moreover, neither is harmful to rubber. Latices sensitized with 2-nitro-2-methyl-1-propanol have the unique and valuable property of enduring long periods of storage at room temperature without gelling, but retaining the ability to gel when heated.

Pliolite-Rubber Mixtures. ***Herman R. Thies (Goodyear Tire & Rubber Co., Akron, Ohio).***

Some fundamental differences between rubber and the cyclized rubber derivative known as Pliolite are given. The uses of Pliolite in rubber and of rubber in Pliolite are discussed. The technique of making these mixtures is shown, together with the compounding data and the physical properties of them. Mixtures of Pliolite with some of the synthetic, rubber-like materials are described.

In the above mixtures, in general, Pliolite functions as a resilient stiffening, toughening compounding ingredient which analyzes chemically as rubber. Examples of the uses of these mixtures range from a flexible coating for cloth and silk through to the use as a tough, cutproof cover for golf balls and as a pure gum, thin-walled electrical insulator for wire.

Test Formulas for Reclaimed Rubber. ***Henry F. Palmer and Robert H. Crossley (Xylos Rubber Co., Akron, Ohio).***

The purpose of this paper is to show the desirability of replacing the reclaim-sulfur mix with compounded test formulas as a method of testing reclaimed rubber, and to make specific recommendations of test formulas which can be used. Tests obtained from the reclaim-sulfur mix are found to be much more erratic, from test to test of the same sample of reclaimed rubber, than tests obtained from compounded test recipes. Different samples of reclaimed rubber are shown to display equivalent results in compounded test formulas, although they may vary widely when the reclaim-test is used.

Various types of accelerators which may be used in test formulas are discussed, and the combination of dibenzothiazyl dimethyl thiolurea (El Sixty) and diphenyl-guanidine is found to be satisfactory for most types of reclaimed rubber.

Specific recommendations of compounded test formulas for reclaimed rubber, to replace the reclaim-sulfur mix, are made. If the rubber and fillers in these test formulas are masterbatched, the test requires no more time and labor than the reclaim-sulfur mix.

It is concluded that the results of tests of reclaimed rubber in compounded test formulas are more consistent, and more indicative of the final performance of the reclaimed rubber, than the results of tests in the reclaim-sulfur mix.

Effect of Petroleum Products on Neoprene Vulcanizates. IA. Effect of Lubricating Oils. ***Donald F. Fraser (Rubber Chemicals Division, DuPont, Wilmington, Delaware).***

A volume increase test after immersion in lubricating oils is frequently made part of the requirements of control specifications for fabricated neoprene parts. Because of the probable intended use for the neoprene part, such a test is entirely logical provided the conditions (time and temperature of immersion) of the tests are intelligently chosen. Lubricating oils are often used as the immersion media rather than other petroleum derivatives, such as kerosenes, fuel oils or gasolines. The former media are generally preferred because of the decreased fire hazard and storage risk and because they undergo less chemical change upon long time storage or during the actual immersion test.

If an arbitrarily chosen oil is selected as a standard, it is necessary to include in the specification for the oil some test which will delimit the oil with respect to its swelling effect on neoprene vulcanizates. This is especially necessary when various laboratories agree to use a given oil as a standard for purposes of reference or cross testing work or where the original oil is to be duplicated. In the previous paper of this series, it was shown that in the case of commercial lubricating oils the viscosity-gravity constant may be successfully used as a criterion of the swelling effect of an oil on neoprene vulcanizates, the volume increase at swelling equilibrium being a logarithmic function of the viscosity-gravity constant.

The viscosity-gravity constant is calculated from constants, the determination of which involves the use of rather specialized apparatus. However, it is shown that the aniline number, a determination which may be easily made and does not require special equipment, is as equally reliable as the viscosity-gravity constant when used as a criterion of swelling effect of commercial lubricating oils. With special oils, such as technical white, spindle and process oils, the aniline number appears to give more reliable results. In the case of compounded hydraulic brake oils, a relation exists between the aniline number of the oil and volume increase of the neoprene vulcanizate but the relation is of a different order than that in the case of lubricating oils. In both cases the volume increase at swelling equilibrium is a logarithmic function of the aniline number. Because of the presence of compounding ingredients in hydraulic brake oils, it is necessary to take extra precautions in determining the aniline numbers of these oils. The effect of time and temperature upon the swelling equilibrium has been discussed previously.

This paper is presented to show that the swelling effects of petroleum derived oils may be predicted by a simple test (aniline number). It is advocated that oils to be used in immersion tests in acceptance specifications be referred to by aniline number rather than by viscosity rating or some other physical constant which does not predict the swelling effect of the oil on the vulcanizate.

The Effect of Various Sulfur-Accelerator Ratios in Vulcanized Rubber as Shown by a Series of Laboratory Tests. ***F. S. Conover (Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn.).***

During recent years much emphasis has been placed on the use of extremely low sulfur (0.5 or under) for the production of rubber compounds designed for extraordinarily good aging properties. Stocks so designed have been found very useful for wire insulation and some other products in which extremely good aging is of paramount importance. It is felt, however, that there has been a tendency to extend the use of low sulfur to places where it is neither required nor suitable.

A number of cases are known in which low sulfur has been used with definitely detrimental results on properties other than aging. The present work was undertaken for the purpose of determining which properties of rubber compounds were improved by low sulfur and which were not, in hope of shedding new light on the subject.

The results obtained indicate that while low sulfur stocks age better than others, as judged by the usual stress strain data, and while (when properly accelerated) they will produce low

heat generation, low permanent set and low compression set, they do not produce good flexing nor good Fade-Ometer resistance. They are not outstanding for resistance to tear, to oil, nor in tensile tests at elevated temperatures.

The data illustrate the fact that while low sulfur compounds may be extremely useful in some applications, they should be used with extreme caution or avoided altogether in other types of service. While a considerable amount of work has been done and much data collected, it is not felt that the subject has been exhausted.

Creaming of Rubber Latex. ***E. A. Hauser and B. Dewey, Jr. (Massachusetts Institute of Technology, Cambridge, Mass.).***

With the growing development of the direct application of latex in the rubber industry, increasing interest is being paid to the possible methods for latex concentration. Creaming is recognized as one of the most important methods for concentration now available. Although considerable work has been done to explain the phenomenon, a number of aspects need further clarification to either complete a generally acceptable picture or to settle differences of opinion still existing between various investigators.

The work to be presented takes into detailed consideration the methods of preparation of the creaming agent, its concentration, and its adsorption in the latex particles. The mechanism by which clustering, the cause of stratification, takes place has also been studied.

For the greater part of the work locust bean gum has been used as creaming agent. The results show that for best results the creaming agent must be completely swelled before mixing with the latex. Appropriate mixing procedures are discussed. Using the most efficient methods of mixing it was possible to establish an optimum concentration of creaming agent at which the rubber concentration of the cream reached a maximum whilst the rubber concentration of the serum closely approached its minimum. This optimum was also observed using as creaming agent NH_4-alginate instead of locust bean gum. That locust bean gum is not adsorbed during creaming could be demonstrated by extensive viscosity measurements, thus eliminating those theories of clustering which are based upon adsorption.

Experimental evidence is given to show that an interaction between creaming agent and latex serum exists, which is of predominant importance in evaluating the mechanism of creaming. This greatly strengthens a theory based on destabilization of the rubber particles by dehydration caused by the added creaming agent. Further results point to an irreversible denaturization of the latex protein accompanying its dehydration.

A Torsional Hysteresis Test for Rubber. ***M. Mooney and R. H. Gerke (U. S. Rubber Co., Passaic, N. J.).***

A torsional hysteresis test for rubber is described. The test piece consists of a small, die-cut dumbbell. The shank is 3.8 cm. long (1.5 in.) and uniform in section, roughly 2.5 mm. square (1/10 in.). The upper end of the test piece is fixed. From the lower end hangs, by a short vertical shaft, a light, graduated aluminum circle. The sample and circle thus constitute a torsional pendulum. From visual observations of the amplitude decay in the freely oscillating pendulum, hysteresis is calculated as the common logarithmic decrement. Modulus of rigidity can be calculated from the frequency of oscillation.

Some typical experimental results are given which show the sensitivity of torsional hysteresis to cure, temperature during the test, and to certain compounding ingredients. With tread stocks containing a variety of channel blacks, very close correlation is found between torsional hysteresis and per cent rebound.

The main advantages of this torsional hysteresis test lie in its simplicity, its low cost, and in the fact that the sample does not have to be especially molded. The main disadvantage is that, with the direct visual observation of amplitudes, the frequency must be low. The test has been useful in compound development and in factory control work.

Determination of Free Carbon in Rubber: The Cresol Method. ***J. B. Roberts, Jr. (U. S. Rubber Co., Detroit, Mich.).***

An analytical method is described for the determination of free carbon in either raw or vulcanized rubber mixes. It eliminates the use of hot concentrated nitric acid, and possesses definite advantages over the nitric acid method in (a) accuracy, (b) speed, (c) safety, (d) application to raw stocks, and (e) fewer failures.

The method comprises, essentially, (a) digestion of the sample in hot cresol, followed by dilution in gasoline; (b) filtration of the solution of rubber through asbestos on a Gooch crucible to obtain the fillers, including free carbon; (c) the removal of soluble matter by washing with several solvents; (d) the removal of volatile matter by a short ignition in an atmosphere of carbon dioxide; (e) the final determination of free carbon by weighing, igniting in air, and determining the loss in weight. Modifications of the procedure necessary to avoid errors due to certain interfering substances are also given.

Data are presented showing the accuracy and precision of the method when applied to rubber mixes of accurately known free carbon contents. The method of preparation of these stocks is given. Data also are given on the effect of interfering substances which are occasionally encountered in rubber. Comparisons of results by the new method and by the nitric acid method are shown. The proper conditions of time and temperature for the hot cresol digestion are also shown, with data on the effects obtained by varying these conditions.

The Crystallization of Vulcanized Rubber. ***Norman Bekkedahl and Lawrence A. Wood (Rubber Section, National Bureau of Standards, Washington, D. C.).***

The crystallization of unvulcanized rubber in the unstretched state has been observed in previous work to occur at temperatures between 10° and —40° C., the crystals melting in a range from about 6° to 16° C. Similar observations have now been extended to two sets of rubber compounds, the one set vulcanized with sulfur alone in amounts up to 0.5%, and the other set vulcanized with tetramethyl thiuram disulfide (Tuads) in amounts up to 4% and containing 2% of zinc oxide.

Change of volume, as measured in a mercury-filled dilatometer, was taken as the criterion of crystallization. At about 1° C. all the compounds studied were found to crystallize, the time required for completion of the process increasing with the amount of sulfur or tetramethyl thiuram disulfide from about 10 days to about 200 days. With increase in the amount of vulcanizing agent, the change of volume on crystallization was found to decrease from the order of 2.5% to the order of 1.5%. The melting of the crystals in all cases occurred over about the same range as the unvulcanized rubber.

Although the maximum amount of sulfur in the rubber-sulfur compounds was insufficient to give satisfactory mechanical properties, this was not the case with the tetramethyl thiuram disulfide, for which the amounts employed span the range of commercial usage.

Effect of Sulfur and Carbon Black Contents on Physical Properties of Perbunan Compounds. ***C. A. Klebsattel (Advance Solvents & Chemical Corp., New York City).***

Perbunan is one of the newer synthetic rubbers which is scheduled for manufacture in the U.S.A. Its composition and most important attributes are outlined very briefly.

The similarity of Perbunan compounding as compared to that of natural rubber is outlined in some detail. It is pointed out that, as with natural rubber, sulfur is required for vulcanization and likewise that the various carbon blacks produce enormous reinforcement of Perbunan. While these statements are true in a qualitative sense, there is a great difference in quantitative results between Perbunan and natural rubber.

Experimental data in the form of tables and charts will be given to illustrate the influence of varying percentages of sulfur in a typical Perbunan compound as demonstrated by the resultant physical tests and aging characteristics of the vulcanized

compounds. The three most prominent types of carbon blacks are similarly treated. Tables and charts will demonstrate the effect of a wide range of loadings of hard, highly reinforcing channel blacks, semi-reinforcing blacks, and a soft black upon the commonly determined physical properties of a commercially useful Perbunan compound.

The data presented will demonstrate plainly the desirability of holding the sulfur content of a Perbunan compound to a maximum of 2% sulfur on the weight of the Perbunan for all save special purposes. The data on the effect of the various carbon blacks permits immediate determination of the amount of any of the blacks required in a normal type Perbunan compound to secure any desired physical strength, hardness, modulus, or other common physical requirement obtainable through the use of these fillers.

Vistanex Polybutene-Rubber Blends. ***S. Longman (Advance Solvents & Chemical Corp., New York City).***

The introduction outlines briefly the characteristics peculiar to the high molecular weight polybutenes marketed as Vistanex. Similarities in physical properties as compared to unvulcanized natural rubber are presented. Differences between polybutenes and natural rubber are cited to show that outright replacement of natural rubber by polybutenes is not permissible for many applications. Use of reinforcing fillers with polybutenes to gain better physicals is described, and some applications for these simple compounds are described.

The polybutenes have very valuable characteristics which make them desirable partial replacements for natural rubber for many classes of service. The bulk of the paper is devoted to describing the results and tests made upon numerous blends of Vistanex Polybutene and rubber to demonstrate the results which may be obtained. Data is presented to illustrate the influence of different types of reinforcing fillers, milling procedures and processing methods upon the physical properties of the final vulcanized compounds. Practical limitations on the limits of replacement of rubber by the polybutenes for various classes of service are discussed and recommendations for various applications are given.

The use of rubber ebonite as a reinforcer of the polybutenes is described and suggested applications for these blends are given. Actual compounds and test data together with special procedures for their proper preparation are explained. The paper concludes with a description of results obtained by blending high molecular weight polybutenes with cyclized rubber or Pliolite.

Rubber-Like Synthetics in the Automobile Industry. ***J. C. Zeder (Chrysler Corp., Detroit, Mich.).***

Synthetic rubber already plays a vital part in the manufacture of automobiles, and will be more important in the future regardless of trends in Far Eastern affairs which might make synthetic rubbers all important to this country. Automotive laboratories continue to highlight research in elastomers. While synthetics of today are greatly improved over those of a few years back, there is still much to be desired in their qualities. Uses of synthetic rubber have increased steadily in face of high costs, but this use could be greatly accelerated by further decrease in costs.

Rubber in the Automotive Industry from the Viewpoint of the Automotive Engineer. ***George W. Lampman and C. F. Smart (General Motors Corp., Pontiac, Mich.).***

Compounded rubber materials are essential to the modern automobile. The various applications and desired qualities are discussed, illustrating these applications with the aid of a chassis. Some of the discrepancies of past and present rubber parts and improvements made or needed to correct them are discussed. Close cooperation between rubber technologists and design engineers to provide a basis for selecting and developing rubber compounds of suitable properties is emphasized.

Theoretical Stress-Strain and Compression Curves for Rubber-Like Materials. ***Eugene Guth (University of Notre Dame, South Bend, Indiana) and Hubert M. James (Purdue University, Lafayette, Indiana).***

A theoretical stress-strain curve has been derived for rubber-like materials built up from long chain molecules connected into a network by cross bonds. The essential properties of rubber which the model is designed to reproduce are the approximate incompressibility of the bulk material and the flexibility of the rubber chain molecules; the stress-strain curve follows from the application of statistical mechanics. The stress-strain relation for the model is

$$F = K\,[f(La) - L^{-3/2} f(L^{-1/2}a)]$$

Here F is the stress per unit initial cross section and L the relative length ($= \frac{\text{extended length}}{\text{original length}}$; thus $L > 1$ for extension, $L < 1$ for compression). $f(x)$ is defined by the relation $x = \frac{e^{2f}+1}{e^{2f}-1} - \frac{1}{f}$, and is most easily obtained from a graph. K and a are constants characterizing the chain network, $\frac{1}{a}$ being the maximum value of L for the model. Therefore a will increase with increasing cure. For extensions much less than L_{max} the above relation reduces to

$$F = 3aK\left(L - \frac{1}{L^2}\right)$$

This stress-strain curve is still simpler than any of the purely empirically proposed analytical stress-strain curves for rubber. It may be used in rubber technology, for instance, to obtain the pressure-compression curve, given the stress-extension curve, and vice versa. The theoretical stress-strain curves show fair to good agreement with equilibrium stress-strain curves taken at Notre Dame and elsewhere.

An Immersion Test for Rubber Compounds. ***B. S. Garvey, Jr. (B. F. Goodrich Co., Akron, Ohio).***

A die cut sample 100 mm. long (1.6 mm. wide and 0.64 to 3.0 mm. thick) is immersed in a liquid for any specified period of time and at any desired temperature in a glass tube 250 mm. long and 8 to 15 mm. in diameter. After bringing to room temperature, the change in length, ΔL, is read in millimeters by placing the tube in the proper position on suitable graph paper illuminated from below. The corresponding per cent increase in volume, ΔV, is read directly from a prepared table.

With molded sheets, using the present apparatus and procedure, ΔV is reproducible within $\pm 1\frac{1}{2}\%$ up to approximately 50% and within $\pm 5\%$ at 200-300%. The principal sources of error are small variations in the length of the sample and small inaccuracies due to the apparatus. The former can be eliminated by measuring the sample before immersion or by improving the method of cutting. The latter can be largely eliminated by refinements in the construction of the apparatus.

The method is very sensitive to grain effects and for accurate work special samples will have to be prepared in which this effect is kept at a minimum. Conversely the test might be used as a measure of grain effect.

The new test gives results which are close to but not identical with those obtained by the present standard A.S.T.M. test. The measurements can be made 5 to 10 times as fast and calculations are eliminated. Hence, this method has obvious advantages in many cases.

This procedure is fast and simple. All weighings and calculations are eliminated. Volume change is determined without removing the sample from the liquid. Space requirements are small. With special graph paper the change in volume could be read directly. Special apparatus for fast, accurate measurement could be made at low cost.

Editorials . . . . . .

Synthetic Rubber

JAPAN is making the best possible use of the present world situation. That Japan feels that the rich natural resources of East Asia, especially rubber and tin, can be used as economic levers against the United States was well illustrated last month by statements issuing from official and semi-official sources, as reported elsewhere in this issue. One of these sources made the flat statement that if the United States followed up on its recent licensing regulations by embargoing shipments of oil and scrap metal to Japan, that country in turn would block all shipments from the East.

Although Japan has definitely included the Netherlands East Indies in its program for a "new order in East Asia," no mention has yet been made of British Malaya. It is to be presumed that that territory, too, would eventually be included in the Japanese program, depending of course on the turn of the current international situation. Following the usual totalitarian procedure, Japan has already raised cries of "oppression" and "exploitation" with regard to the peoples of the Netherlands Indies, and a commission will soon head for that country to determine on the best method to be used in "protecting" it and its rich resources.

There is little doubt that serious trouble is brewing in East Asia, and that the blocking of rubber shipments from the Netherlands Indies, and possibly from British Malaya, is not an impossibility. That the National Defense Advisory Commission gave full consideration to such a possibility is evident by the fact that moves to make this country independent of all foreign sources of crude rubber were among the first made.

In the very first report of the Materials Procurement Division of the Commission, issued last month, Edward R. Stettinius, Jr., director, revealed that a plan for the production of sufficient synthetic rubber has already been worked out, one "which could eliminate our dependence on imports at any time imports were restricted or cut off." The fact that such a plan has already been worked out is naturally of vast importance to the domestic rubber manufacturing industry, but two additional statements made by Mr. Stettinius make it of even greater importance, *i.e.*, that the program has been carried to a point where plans for individual producing units have been engineered and that it provides for a synthetic rubber which can be produced and sold for 25 cents a pound.

From time to time some company has reported that it could produce a synthetic rubber for a 25-cent price per pound. These reports have always been received with considerable doubt and credited to a "tongue-in-cheek" attitude of the company concerned. However, under a consolidated engineering program designed to furnish some 500,000 tons annually it is not beyond comprehension. It would probably entail government subsidies and the overlooking of a few practices treading on anti-trust laws, but under emergency it could be done. One hitch would be the training of technical help but even this obstacle could be surmounted.

How much would it cost to institute such a program and how long would it take? Although Mr. Stettinius' report gave no intimation of the answers to these questions, estimates appear in an interesting article on the synthetic rubber problem in the current issue of *Fortune*. According to this article, it would take about two years to launch mass production methods for synthetic rubber while the cost would run between $100,000,000 and $200,000,000, or about the cost of one or two battleships or less than the cost of a normal year's supply of crude rubber. These facts and figures should serve to allay growing fears concerning the shutting off of crude rubber shipments from the East.

CURRENT NEWS OF THE MONTH

CLASH OVER RUBBER SEEN BETWEEN U. S. AND JAPAN

Shortly after President Roosevelt had announced that shipments of oil and scrap metal had been placed under the licensing measures introduced early last month, veiled threats were heard from Japan relative to the status of the Netherlands East Indies. Taking the position that the licensing of shipments of these materials was a direct blow aimed at Japan, Yakichiro Suma, spokesman for the Japanese Foreign Office, in Tokyo, stated that such measures would inevitably arouse repercussions in the international situation.

Foreign diplomatic observers in Tokyo express the belief that Japan's policy toward the Netherlands East Indies will be the first affected should shipments of oil and scrap metal from the United States be halted, a decision which rests with the State Department at Washington, D. C. These observers state that commandeering of the Netherlands Indies entire output of rubber and tin will become a question of immediate military necessity.

Japanese newspapers assailed the placing of the two materials under license regulations. The Japanese newspaper *Nichi Nichi*, one of the most powerful in the country, published a statement to the effect that if the United States actually embargoes Japan's supplies of oil and scrap iron, then Japan will block American shipments of all kinds from East Asia. Official comment, however, has not been as strong.

Only one direct threat has been made to date. General Kuniaki Koiso, who is expected to head a Japanese mission to the Indies in the near future, told Japanese reporters on August 2 that friction may develop between the United States and Japan over the "rich rubber resources" of the Netherlands Indies. Recalled from other duties to discuss the Netherlands Indies situation with officials in Tokyo, General Koiso, until recently Overseas Minister of Japan, said that "the rubber of the East Indies is indispensable for the industry of the United States and therefore the question may give rise to friction." He added, "The solution of this problem, however, depends on our decision."

"The East Indies as a colony (of the Netherlands) long have been oppressed and exploited," General Koiso said. "We cannot tolerate such a condition in view of the principles on which we are establishing the new order in East Asia. It is necessary to emancipate the Oriental races and we are destined to solve this problem. It may be said that the oil, rubber, and tin produced in the East Indies control the world markets. We do not intend to monopolize these natural resources but it is necessary to make sure that they are disposed of impartially."

Registration of Aliens

All rubber manufacturers have been asked by the Department of Justice, Washington, D. C., to cooperate in carrying out the Alien Registration Act of 1940. This act requires the registration and fingerprinting of all aliens above 14 years of age and the registration of aliens under 14 years of age by their parents and guardians. Notices to workers on bulletin boards, in house organs and in other media reaching employees are suggested.

GOODRICH BUILDING FACTORY FOR PRODUCTION OF KOROSEAL

B. F. Goodrich Co., Akron, has started the construction of a new factory at Niagara Falls, N. Y., for the production of Koroseal, its polyvinyl chloride rubber, which is rubber-like in properties. It will be the first plant of the company's synthetic division to be located outside of Akron.

According to present plans, the new factory will be a three-story, steel and concrete building, which will have floor space of 12,000 square feet. Cost of the building and the special equipment will amount to approximately $200,000. Construction is in the hands of the Walter S. Johnson Construction Company of Niagara Falls.

Litchfield Resigns Presidency

As this issue was going to press word was received that Paul W. Litchfield has resigned as president of the Goodyear Tire & Rubber Co., effective as of September 1. Mr. Litchfield, who has been associated with Goodyear for the past 40 years, serving as president since 1926, will continue in his post as chairman of the board of directors. He will be succeeded in the presidency by E. J. Thomas who has been executive vice president of the company since 1938. Further details will appear in our next issue.

RESERVE SUBSCRIBERS NOT SUBJECT TO TRUST SUITS

Preliminary to the formation of the Rubber Reserve Company to purchase and store 150,000 tons of crude rubber to be used in an emergency only, the Department of Justice agreed that it would not prosecute the participating rubber manufacturers under the Sherman anti-trust laws. This was revealed early this month by a spokesman for the Department. The rubber company is capitalized at $5,000,000, half of the capital being subscribed by the Reconstruction Finance Corporation and the other half by major rubber manufacturers.

This was the first application of the agreement made by Thurman Arnold, Assistant Attorney General in charge of the Anti-Trust Division of the Justice Department, that groups of companies would not be prosecuted for violation of the anti-trust laws where a responsible department of the government certified that their actions were necessary for national defense.

It was at the end of May when Mr. Arnold and Secretary Morgenthau had agreed to the plan of certification which was resorted to for the first time in the case of the rubber industry. The Department of Justice requires that the certifying department present it with a state of facts, covering the activities which the particular industry will undertake in connection with national defense.

The Department of Justice, its spokesman explained, is not obliged to refrain from prosecution if the industry in question carries on questionable activities beyond those outlined in the preliminary statement of fact.

When Jesse Jones was forming the Rubber Reserve Company, creation of which he announced July 1, he asked the department through the R. F. C. if the rubber companies participating in the new Federal corporation could get together to do certain things which were regarded as essential for national defense. The facts were outlined and the Justice officials approved.

Of necessity the companies contemplated having to work cooperatively with regard to the reserve company and in handling and utilizing the stock piles of rubber, so that they were reluctant to proceed until the Department had given Mr. Jones a "green light."

NEW COMPANY IS ORGANIZED TO MAKE SYNTHETIC RUBBER

The Hydrocarbon Chemical and Rubber Company, a new synthetic rubber manufacturing firm, has been organized by the B. F. Goodrich Company and the Phillips Petroleum Company. According to an announcement issued jointly by David M. Goodrich, chairman of the Goodrich board, and Frank Phillips, chairman of the Phillips board, the new concern was formed "to increase the production of synthetic rubber so that additional commercial quantities can be made promptly available for use in national defense and throughout industry."

Headquarters of the new company will be in Akron. It is understood that either a new plant will be constructed in Akron for the manufacture of synthetic rubber or a portion of the Goodrich plant may be taken over. It is not quite clear at this writing whether Ameripol, the "Liberty Rubber" announced by Goodrich several weeks ago, which is already being used in commercial tires, will be made by the Hydrocarbon Chemical & Rubber Company, or whether the production of this material will be solely a Goodrich matter. The new company will of course offer its products to the entire rubber industry.

Facilities to be Combined

According to the announcement, Goodrich and Phillips are combining their facilities for the manufacture of synthetic rubber in the new concern. Whereas Goodrich is already engaged in the manufacture of synthetic rubber, based on laboratory experimentation over a period of at least 14 years, the Phillips Petroleum Company has a strong patent position in the processing of petroleum hydrocarbon and possesses immediate supplies and vast reserves of the raw materials used in the production of such synthetic rubbers as Ameripol.

Although no officers have as yet been selected for the Hydrocarbon Chemical & Rubber Co., directors representing the Phillips Petroleum Company in the new concern are Frank Phillips, chairman; K. S. Adams, president; and G. G. Oberfell, vice-president in charge of research. Representing Goodrich are David M. Goodrich, chairman; John L. Collyer, president; and T. G. Graham, vice-president in charge of production.

Ross W. Thomas, general manager of the Philgas Division of Phillips, described as "the man primarily responsible for the spectacular growth of this division, now the largest marketer of liquefied petroleum gas," is in charge of sales for the new concern. Dr. Waldo L. Semon, who is credited with the development of Koroseal and who played a leading role in that of Ameripol, will be director of research.

"Over the past 20 years Phillips has pioneered many important advances in this field, among which are the development of the thermal polymerization and alkylation processes and the production of two super-aviation fuels, isooctane and neohexane, which can be combined into the world's most powerful aviation gasoline. Immense reserves of raw materials owned by Phillips assure the new company fullest access to the hydrocarbons necessary for the production of synthetic rubber's butadiene base," the announcement stressed.

The speed with which the company plans to increase its production has been made practical, it was explained, because of the rapid strides within the past few months in developing compounds of these new materials.

"In fact, it can be said that we have learned almost as much about processing synthetic rubber in 100 days as was learned about natural rubber in 100 years," the statement declared.

The B. F. Goodrich Company launched an advertising campaign in the daily press on July 30 on its new tires made with Ameripol, the so-termed "Liberty Rubber." The copy stresses the point that the synthetic rubber tires are slightly higher-priced than regular tires, but that increased production is expected to even out the level.

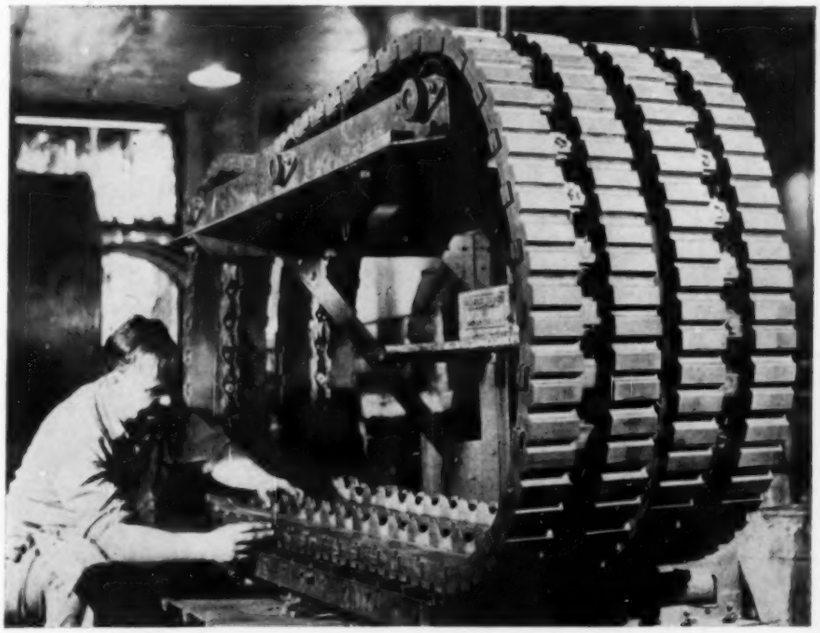
AMERICAN CYANAMID DOUBLES PRODUCTION OF ACRYLONITRILE

Production of acrylonitrile, intermediate in the manufacture of some of the newer so-called synthetic rubbers, is being doubled to meet increasing demand for this product, according to a statement by B. W. Henderson, manager, Rubber and Rubber Chemicals Division, American Cyanamid and Chemical Co., New York City. Acrylonitrile, derivative of cyanamide, and butadiene, made from petroleum, are combined to produce synthetic rubber.

Commercial production of acrylonitrile was undertaken by American Cyanamid several months ago to supply a rising demand. This demand has already required a doubling of production capacity and further substantial increases are expected as its use for synthetic rubber and other purposes grows. No limit to potential production of the material is anticipated at present.

Acrylonitrile is a colorless liquid with a mild odor, boiling at 77°C. It is highly reactive chemically and its present availability in large quantities is expected to lead to new uses in chemical synthesis, as well as in the field of synthetic resins and plastics. The material, according to Mr. Henderson, possesses a high purity and since it is quite non-corrosive it can be safely handled and shipped.

RUBBER TRACKS FOR TANKS CAPABLE OF 60-M.P.H. OVER ROUGH TERRAIN



The B. F. Goodrich Co., Akron, was recently awarded a $1,409,439 defense program contract for tank band tracks. Announcement of the award was made by Assistant Secretary of War Louis Johnson, who has since resigned from that post. In the above photograph a workman at the Goodrich plant is shown putting the finishing touches on the rubber tracks for tanks capable of speeding 60 miles-an-hour or better over the roughest kind of terrain.

TERMS OF OFFICIAL AGREEMENT BETWEEN THE RUBBER RESERVE COMPANY AND THE INTERNATIONAL RUBBER REGULATION COMMITTEE

Complete details regarding the organization of the Rubber Reserve Company by the Reconstruction Finance Corporation to handle the purchase of an additional 150,000 tons of crude rubber to be used only in the case of emergency, one of the first moves in the National Defense Program, were given in our previous issue. The first act of the newly-organized rubber purchasing concern was the entering into an agreement with the International Rubber Regulation Committee relative to the securing of the reserve rubber. We present herewith the official agreement.

MEMORANDUM OF AGREEMENT

Memorandum of Agreement dated as of June 27, 1940, between Reconstruction Finance Corporation (herein called the "Corporation"), Rubber Reserve Company, a corporation created by the Reconstruction Finance Corporation (herein called the "Company"), and The International Rubber Regulation Committee (herein called the "Committee").

ONE

In order to aid in the National Defense Program, the Corporation agrees that it will make a loan or loans to the Company upon satisfactory terms and conditions, in such amount as may be necessary, and the Company undertakes, with the proceeds thereof, to acquire by purchase a reserve stock of crude plantation rubber (*Hevea brasiliensis*) of a minimum quantity of 100,000 tons and a maximum quantity of 150,000 tons for shipment between the date of this instrument and December 31, 1940, such rubber to be designated a reserve stock.

In addition, the rubber manufacturers as represented by the Rubber Reserve Company will endeavor to continue their current purchases of crude rubber within the range price hereinafter mentioned in such volume as will be necessary to meet current requirements and to maintain within the United States during the period that the rubber stock is being accumulated a normal stock for current requirements and purposes. Such a stock shall be interpreted as a quantity of plantation rubber of 150,000 tons (for the entire industry in the United States) and shall be in addition to the reserve stock above referred to.

To the extent that the manufacturing rubber industry fails to maintain its stock at the figure aforementioned, the Rubber Reserve Company to that extent undertakes to increase its purchases above the maximum of 150,000 tons, provided that any rubber so purchased above said maximum may be released to manufacturers within the United States and shall not be subject to the provisions of paragraphs Six and Seven hereof.

TWO

In consideration of the undertakings above described. John George Hay, Kt., agrees, on behalf of the Committee that the Committee in exercise of the powers conferred upon it by Article IV, Treaty Series No. 74, 1938, will permit the release of the quantity of rubber which may be necessary for the accomplishment of the purposes herein described as well as for all other known demands.

THREE

If, notwithstanding the action of the Committee, acting in full accord with the provisions of this agreement, the supply of rubber or the facilities for the transportation thereof should be inadequate for the accomplishment of the purposes herein set out within the period named, purchases shall continue nevertheless for shipment subsequent to December 31, 1940, as may be necessary for the accumulation of the reserve stock of crude plantation rubber of 150,000 tons.

FOUR

It is understood that during the period necessary for the purchase and accumulation of the reserve stock of rubber hereinabove mentioned, such rubber shall be purchased at not less than 18 nor more than 20 U.S.A. dollar cents a pound c.i.f., New York, for standard smoked sheet, packed in cases or in bales at seller's option, with the usual differential for other qualities and other forms of purchases, exempli gratia Ex. Godown, f.o.b., landed.

Purchases, sales and deliveries shall be made under contracts adopted and now in use by recognized Rubber Trade Associations and any claims or disputes arising regarding insurance, shipment, packing, quality, payment, freight and cognate matters shall be settled in accordance with the recognized customs of the rubber trade.

FIVE

The Committee, represented by John George Hay, Kt., undertakes to encourage producers of rubber to be ready sellers at the range between the two prices mentioned in paragraph Four hereof, 18 to 20 cents per pound c.i.f New York, payable in dollars, New York Exchange. The Company undertakes to use its best endeavors so as to arrange its purchases that the price will be maintained within the range specified.

SIX

The Company agrees that as the reserve stock is acquired it will be held separate from the normal trade stocks and will not be disposed of (otherwise than for the purpose of replacement through equivalent quantities as may be expedient for the prevention of deterioration and in such manner that the quantity thereof will at all times be maintained intact) except as required by the Government of the United States of America for its defense program or in the event of normal supplies being interrupted through hostilities, or any similar emergency. In such latter event, releases from the reserve stock will be permitted only to the extent necessary to maintain trade stocks at their normal level.

SEVEN

Subject to the provisions of paragraph 6, the Company agrees that the reserve stock shall be held intact until December 31, 1943, thereafter to be liquidated at not more than 100,000 tons per annum and in such manner as least to disturb the world price of crude rubber. The Company undertakes to inform the Committee of its intention to liquidate the reserve rubber supply in accordance with this provision and to keep the Committee informed as to the progress of such liquidation.

EIGHT

In the event of circumstances under which the decisions of the Committee, through causes beyond its control, cease to be operative in the territories of the Netherlands' East Indies or in the territories commonly known as British Malaya, then the Committee agrees to consult immediately with the Company for the purpose of determining what action shall be taken with respect to the provisions of this memorandum.

Discusses Synthetic Rubber

An interesting article on synthetic rubber, its current status and its future possibilities, appears in the August issue of *Fortune*. According to the article, leaders of the rubber industry are now prepared to place synthetic rubber on a mass production basis before any serious shortage of crude rubber could develop. Technical experts are confident, the article states, that it could be done in two years at a total capital investment in the neighborhood of $100,000,000 to $200,000,000, or about the cost of one or two battleships or of less than a normal year's supply of natural rubber. Price, it is stated, is the "critical lever." Discussing Standard Oil's position on the buna rubbers, the article declares that Firestone, the first to be licensed by the oil concern, is already constructing a special plant for the production of buna, and that U. S. Rubber has since been licensed.

New Course in Rubber Chemistry

Coincident with the announcement by the Polytechnic Institute of Brooklyn, N. Y., of the appointment of Dr. H. Mark of Hawkesbury, Canada, as Professor of Organic Chemistry, the Institute has announced that Dr. Mark will give two courses of lectures in the Graduate Division for the year 1940-41, one dealing with the physical aspects of organic chemistry and the other with the chemistry of rubber. Dr. Mark, previously associated with the University of Vienna, has done considerable work on the elasticity of rubber.

PHILIPPINE AUTHORITIES SCAN RUBBER POSSIBILITIES

A group of Philippine authorities, led by President Manuel L. Quezon, are known to be actively engaged in studying the possibilities of developing rubber plantations in the immediate future to supplant the sugar industry which faces economic ruin when the duty-free American market is cut off coincident with Philippine independence in 1946. President Quezon, accompanied by a group of wealthy sugar growers, recently visited the vast undeveloped Mindanao Island to consider the possibility of establishing at least 250,000 acres devoted to rubber cultivation.

In addition to the necessity of developing some of the Philippine Islands resources to other than sugar cultivation, the authorities are concentrating on the possibilities of rubber cultivation from three separate angles: (1) The growing necessity for sources of supply other than from territories controlled by present belligerent nations; (2) The territory lies in a favorable rubber cultivating belt; and (3) The belief that after the country receives its independence it will still receive preferential treatment from the United States.

Past efforts to encourage rubber cultivation in the Philippines failed with local growers because bigger profits could be made more easily with sugar. A sugar crop can be produced in 12 months from scratch whereas it takes at least seven years before rubber trees approach production. Moreover, rubber trees require expert cultivation from the outset, as compared with lesser technical supervision called for by sugar crops.

Island Law Stumbling Block

Attempts by American rubber manufacturers to establish plantations in the Islands have always been stymied by the local land laws which prohibit acquisition of more than 2,500 acres of land by a single person or company. This law led the late Harvey Firestone, Sr., to drop any effort to establish a plantation in the country after a Firestone expedition had determined that Mindanao Island was ideally suited for rubber cultivation. Goodyear, at present, has a plantation in the Philippines, restricted to the 2,500 acres permitted by the law.

Quezon plans to have the insular government establish a rubber experimental station in Mindanao to provide expert advice to embryo Filipino rubber growers. He has indicated one of the large American rubber manufacturing companies has offered the services of its experts. Filipino capital now concentrated in sugar would be gradually shifted to the rubber industry with the cooperation of the commonwealth government.

Quezon also envisions a second rubber growing community in Mindanao's fertile Koronadal valley made up of Filipino homesteaders on public lands his administration recently opened for settlement. A somewhat socialistic experiment, homesteaders in Koronadal valley receive paternalistic financial aid from the government. The experiment was patterned after the United States' resettlement project in Alaska.

Assuming a ready market for Philippine rubber could be obtained in the United States after independence, economists counseled Filipinos against counting on rubber as a cushion for the economic jolt the islands face upon liquidation of the sugar industry. The transition from sugar to rubber, it was pointed out, would be slow and costly.

Coming Events

Sept. 12-13. Rubber Division, A.C.S., Annual Meeting, Book-Cadillac Hotel, Detroit, Mich.

Oct. 7-11. National Safety Congress, Stevens Hotel, Chicago, Ill.

Jan. 6-10. S.A.E. Annual Meeting, Book-Cadillac Hotel, Detroit, Mich.

June 23-27. A.S.T.M. Annual Meeting, Palmer House, Chicago, Ill.

Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, has produced a new sound motion picture telling the story of neoprene. The picture runs 20 minutes and shows how neoprene is made, explains its chemical formulas by means of animated cartoons, shows several tests, and pictures hundreds of applications. It is available without charge to any organization having a 16 mm. sound projector available.

Product liability insurance is now available for reconditioned, retreaded, recapped or vulcanized tires through the National Association of Independent Tire Dealers, Inc., 250 West 57th St., New York City.

A new tire mounter which is said to reduce the time for the job of tire mounting considerably has been introduced by the Alemite Division, Stewart-Warner Corp., Chicago, Ill. In three simple operations, the new device will mount tires on 15-inch and 16-inch drop center rims in approximately 10 seconds.

The Bakelite Corporation and the Halowax Corporation, a subsidiary, have moved their New York offices from 247 Park Avenue to the Carbide & Carbon Building, 30 East 42nd Street.

STETTINIUS ASSURES NATION OF ADEQUATE RUBBER SUPPLY

An adequate supply of rubber as well as other strategic materials for which the United States is currently dependent on foreign sources was assured the nation by Edward R. Stettinius, Jr., member of the National Defense Advisory Commission, who is in charge of the Materials Procurement Division, in the first "progress report" of the division, made public on July 13. The situation in nine fields of defense supplies was covered in the report.

When the Commission first surveyed its problems, Mr. Stettinius said, its members felt that the matter of adequate rubber supplies was one of the most pressing, because of the possibility that imports of crude rubber from the Malay Peninsula and the East Indies might be cut off. He expressed the belief that this problem had been solved through development of a program for the production of synthetic rubber at an economical cost by several manufacturers. This program had been carried to the point where plans for individual producing units had been engineered.

"Considering the stocks on hand of raw and reclaimable rubber," Mr. Stettinius asserted, "we feel that before this month is over we will have a plan of synthetic production worked out which could eliminate our dependence on imports at any time imports were restricted or cut off. Some of this production will go ahead anyway, because the synthetic product, which can be produced for around 25 cents a pound, is more suitable for certain purposes than natural rubber."

SALES OF CARBON BLACK REACHED NEW PEAK IN 1939

The carbon black industry in the United States reached new peaks of production and consumption in 1939, owing to the demands of the warring nations and to the recovery in the production of rubber goods in this country, according to a report from the Bureau of Mines of the U. S. Department of the Interior.

Production amounted to 525,166,000 pounds, 10% more than in 1938. Total sales reached 560,533,000 pounds, an increase of 36% over the previous year, domestic sales increasing 47% over those in 1938 and 14% above the previous peak recorded in 1936, while exports passed the 200,000,000 pound mark for the first time.

The position of stocks improved considerably, but prices remained low throughout the year. Stocks on hand on December 31, 1939, amounted to 130,792,000 pounds, which compares with the 166,159,000 pounds on hand at the first of the year. Although the domestic price rallied slightly in 1939 as compared with 1938, export quotations were lower.

FINANCIAL NEWS

U. S. RUBBER COMPANY'S SALES REACH TOTAL OF $109,782,572

Sales for the first six months of 1940 of the U. S. Rubber Company reached $109,782,572, the highest in any similar period in the past 21 years, representing an increase of $21,433,524, or 24%, above the $88,349,048 reported for the first six months of last year, according to the company's report to stockholders. The consolidated net income for the period, after all charges, taxes, reserves and a loss of $437,345 on the sale of its former office building, was $4,234,239, equal after preferred dividends to 94c each on 1,736,092 common shares, compared with $4,465,397, or $1.18, in the corresponding period of 1939.

For the period, $1,436,597 was provided for Federal income taxes, against $1,033,496 last year, while $847,330 was set aside for foreign income taxes as compared with only $25,605 a year ago. Included in foreign income taxes was the sum of $165,432 for war defense taxes assessed in 1940 retroactively against 1939 income by the Government of the Netherlands East Indies where U. S. Rubber maintains plantations.

Earnings per share amounted to $1.19 before the loss on the general office building, incurred when the company moved to new headquarters in New York City. Direct taxes during the half year totaled $12,644,000, including $6,916,000 of Federal excise taxes on tires and tubes, $1,436,000 of Federal income taxes, and $1,220,000 of social security taxes.

Current assets as of June 30, 1940, amounted to $111,591,451 and current liabilities to $33,722,720, compared with $105,170,153 and $30,710,116, respectively, on December 31, 1939. Cash was $10,174,215, against $14,426,722, and inventories at lower cost or market were $63,327,359, against $60,973,436. The consolidated balance sheet shows total net assets of $186,213,609 at the end of June, 1940, compared with $182,295,401 at the end of December, 1939.

In a statement accompanying the report, F. B. Davis, Jr., president, said that of the net consolidated earnings of $4,234,239 a total of $1,029,788 was derived from the company's plantations. He also revealed that of the total net assets of $186,213,609, the sum of $36,387,352 consisted of foreign assets, divided as follows: Netherlands East Indies Plantations, $11,075,962; British Malaya Plantations, $10,490,544; Canada, $11,465,147; England, $1,042,206; Continental Europe, $384,841; Other (Export), $1,928,652. All known losses in foreign countries have been reflected in the accounts.

Mr. Davis also pointed out that during the past six months a total of eight subsidiary corporations were liquidated. Most of the liquidated concerns had been acquired when U. S. Rubber bought the assets of the Fisk Rubber Corporation last December. One company liquidated, but not included in the Fisk transaction, was the Gillette Rubber Co. This company was liquidated early this year, after the remaining minority interest had been acquired.

NET PROFIT OF $1,362,691 REPORTED BY B. F. GOODRICH

The B. F. Goodrich Company reports a consolidated net profit of $1,362,691 for the first six months of the current year, equal to 26c a share on the common stock after providing for preferred dividend requirements, which compares with $3,122,728, or $1.61 a share, in the corresponding period of last year. The 1939 earnings included non-recurring profits of $415,188 and the results of operations of certain foreign European subsidiaries not consolidated in the present report.

Consolidated net sales for the first half of 1940 totaled $67,502,026, an increase of 6.4% over the net sales for the corresponding period of 1939, after excluding in both periods net sales of the European subsidiaries not now consolidated. The consolidated balance sheet as of June 30, 1940, shows current assets of $75,176,134 and current liabilities of $13,044,838, a ratio of 5.76 to 1.

Investments in and current accounts with certain European subsidiaries were shown at $1,734,540. These subsidiaries, it was pointed out, are located in belligerent countries, the principal one being in France. In the absence of adequate information no reserve or charge against surplus has been established in connection with these subsidiaries. According to cable information received from France early in July, the plant of the principal subsidiary in that country was then substantially intact.

General Tire & Rubber Co.

Six Months Ended May 31: Net profit of $280,563, after provision of $233,566 for depreciation, $60,000 for Federal income taxes, and other adjustments, equal to 39c each on 526,427 shares of $5-par common stock after dividend requirements on 24,871 shares of $6.00 preferred stock, which compares with $1,103,575, or $1.96 each on 522,927 common shares, in the corresponding period last year. Net sales amounted to $10,167,972 against $10,917,346.

INCREASE IN EARNINGS IS REPORTED BY GOODYEAR TIRE

Based on net sales of $101,055,607, an increase of 5½% over the $95,756,419 for the same period of last year, Goodyear Tire & Rubber Company reports a consolidated net profit of $4,142,892 for the first six months of 1940, after depreciation, interest, dividends and equity in undistributed earnings of subsidiaries not wholly owned, Federal income tax, and other charges. This compares with $3,610,595 a year ago.

After allowing for dividend requirements on 646,532 shares of $5.00 preferred stock, the current profit is equivalent to $1.23 each on 2,059,168 shares of no-par common stock, excluding shares held in the treasury, as compared with only 96c a common share for the first six months of 1940. Consolidated earnings for the half year were $5,631,150, before interest and other charges, but after providing $5,005,564 for depreciation of plant buildings, machinery and equipment, and after provision for income and other taxes at rates now in effect.

The consolidated balance sheet as of June 30, 1940, shows current assets of $108,254,936, including cash and demand and time deposits of $16,320,830, accounts and notes receivable of $26,871,548, and inventories at lower cost or market of $64,910,396, and current liabilities of $15,155,134, including accounts payable of $9,627,349, reserve of $2,841,310 for United States taxes, and $2,577,557 of foreign bank overdrafts. Total net assets are shown as $191,181,202.

Foreign Assets Revealed

P. W. Litchfield, president, in a statement accompanying the report to stockholders, said that amounts have been appropriated out of current profits sufficient to carry foreign current assets at the rates of exchange prevailing on the date of the balance sheet. The net profits of the foreign subsidiaries after provision for contingencies are incorporated in the consolidated profit and loss statement for the six month period, and an equivalent amount of U. S. dollars was received from abroad during the period. He also stated that certain of the company's foreign subsidiaries were required to make provision for heavy retroactive war taxes imposed by their governments.

In discussing the situation of foreign subsidiaries, Mr. Litchfield revealed that Goodyear's net investments outside of the United States and its possessions, in fixed properties and working capital, are distributed as follows: Canada, $6,281,000; Argentine, $3,474,000; Brazil, $3,179,000; Sweden, $2,178,000; Great Britain, $4,700,000; Australia, $3,948,000; Netherlands Indies, $13,023,000; Other Foreign, $3,993,000. This makes a total of $40,776,000. Goodyear has no investments in Russia, Germany, France or Italy.

BOSTON RUBBER GROUP HOLDS SUCCESSFUL OUTING AT WESTON GOLF CLUB

With approximately 210 members and guests attending dinner and 105 participating in the golf tournament, the Boston Group, Rubber Division, A.C.S., held its most successful outing to date on July 19 at the Weston Golf Club, near Weston, Mass. Arrangements for the outing were in the hands of Joe Haas, of the Hodgman Rubber Co., who was ably assisted by J. C. Walton, chairman of the group, and H. S. Liddick, Emil Krismann, H. P. Fuller, L. R. Clarke, D. D. Wright, and Edward Colligan.

In addition to the golf tournament, a variety of sports events were held during the day, including a soft ball contest which was won by the team representing the Avon Sole Co. Tennis, bowling and quoit honors went to J. H. Clark, B. Mayo, Jr., and Dave Lundquist, respectively. Winners of the golf tournament follow:

Low Net: W. Fish, R. Kelley and Charles Reynolds; Low Gross: F. F. Salamon, A. Allen, Jack Fisher, Sam Tinsley, A. Ryan and W. H. Peterson; Nearest-to-Pin: R. Lockhead (hole in one), G. E. Wilson and D. Higby; Most 5's: Fred Downs; Most 6's: C. L. Muench; Most 7's: J. C. Walton; High Gross: H. A. Atwater.

A surprisingly large number of prizes were available. In addition to the winners in the various sporting events, every person present at the dinner secured a door prize. The prizes were made available through the cooperation of the following concerns: L. Albert & Son, Aluminum Flake, American Mineral Spirits, American Zinc Sales, Ansbacher-Siegle, T. C. Ashley, Archer Rubber, Arrow Electric Supply, Atlantic Refining, American Cyanamid, Anaconda Sales, Avon Sole, S. L. Ayres, Wm. Barrell, Barrett, Binney & Smith, Boston Woven Hose & Rubber, Brooklyn Color Works, Buck Creek Mills, Godfrey L. Cabot, Callaway Mills, Carter Bell, J. F. Carter, Central Supply.

Clinton Sales, C. F. Church, Cleveland Liner, Colonial Beacon Oil, Continental Carbon, Converse Rubber, Davidson Rubber, Dennison, DuPont, Wm. D. Eggleston, Eustis Pennock, Foxboro, G. E. Gale, General Atlas, Genseke, C. P. Hall, Haartz-Mason-Grower, Hird & Connor, Hood Rubber, Hodgman Rubber, Imperial Oil & Gas, Imperial Paper & Color, Innis Speiden, *India Rubber World*, Krebs Pigment, Merck, Merrimac Chemical, Metasap Chemical, J. W. Morrisey, H. Muehlstein, Monsanto, National Rubber Machinery, Naugatuck Chemical, N. J. Zinc, Neville, Norton Abrasives, North & Judd, Oakite Products, Pacific Mills.

Panther-Panco Rubber, Pequanoc Rubber, Philipp Bros., Pratt & Lambert, J. R. Poole, Plymouth Rubber, R.B.H. Dispersions, RUBBER AGE, Reichhold Chemicals, A. Schulman, Schrader, Henry L. Scott, Sanford Mills, Simplex Wire & Cable, Southeastern Clay, Walter Strassburger, Standard Ultramarine, Stamford Rubber Supply, Stewart Bolling, Stowe-Woodward, Stanley Chemical, J. P. Stevens, Sherwin-Williams, Sun Oil, Sunoco Products, Thiokol, Wm. R. Thropp, Titanium Pigment, A. J. Tower, United Carbon, Vansul, R. T. Vanderbilt, Vultex Chemical, Washburn, Weller Chemical, Wesco Water Paints, L. G. Whittemore, Wishnick-Tumpeer, Charles T. Wilson, Wolverine Equipment, and Xylos Rubber.

Firestone's 40th Anniversary

The 40th anniversary of the founding of the Firestone Tire & Rubber Company by the late Harvey S. Firestone was celebrated on August 3 when the company turned over the entire facilities of its factory unit at the New York World's Fair to the production of tires of synthetic rubber. Emphasizing the importance of synthetic rubber in American rearmament and preparedness plans, every tire produced during the day carried prominently the inscription, "National Defense Tire."

Reviewing the forty-year span of the company's existence. Harvey S. Firestone, Jr., vice-president, first traced the development of a number of important contributions made by Firestone to the rubber industry, from the first straight-side tire in 1904 to the modern tractor tire, and then discussed the important role to be played by synthetic rubber in the future.

In concluding his speech, Mr. Firestone revealed that his company, with eight years of experimentation behind it, was ready to go into large-scale production of synthetic rubber at any time a national emergency might make such a move necessary. Firestone now has under construction a new factory in Akron for the production of Buna, under Standard Oil license.

Ohio Rubber Co., Willoughby, Ohio, dismissed a number of workers last month on the ground that they were affiliated with the German-American Bund. All workers concerned have denied any connection with the Bund. The U.R.W.A. has requested the company to re-hire the dismissed employees.

Some of the members and guests at the Boston Rubber Group Outing. All photos by George Warren Smith.

LOS ANGELES NEWS

C. L. Remy, factory manager for the U. S. Rubber Company plant, spent the last week of July on a business trip to Detroit. Fred Carpenter who has spent several months in South America where this company planned to build a factory has returned to the United States. He spent a few days in Los Angeles recently before leaving for New York City.

J. W. Frasche is now manager of the purchasing department at Goodrich succeeding A. D. McPherson who has gone to the home factory in Akron.

A golf tournament involving the four large tire and rubber plants is now under way. Goodyear met Goodrich on August 4 on the Western Avenue course, Los Angeles. The final score was: Goodyear 29½, Goodrich ½. Each team will play one match per month and there will be two rounds. In addition to the attractive trophy now held by Firestone there will also be individual trophies.

Arthur Pond, head of development for U. S. Rubber, has just completed a beautiful new home.

Ed. W. Royal, manager of the local branch for H. M. Royal, Inc., has returned from a business and fishing trip in the Puget Sound area. He was accompanied by his wife who is showing pictures of the largest salmon caught on the excursion. T. Kirk Hill and wife, who also were in the north during the month of August, most of the time in Alaska, also returned late in July.

The first synthetic rubber automobile tires to be exhibited in Los Angeles are being shown at the Goodrich plant, one of these being on exhibition in the main lobby at the factory.

Karl Faulhaber, proprietor of the Faulhaber Rubber Company, 1346 East Slauson Avenue, has returned from another business trip which took him to Wyoming, Montana, and other points in the Rocky Mountain area.

Four employees of the Goodyear Tire and Rubber Company received 25-year pins and company gifts during the past month. They were Howard Bennett, Department III; John Nave, mill room stockman; Mrs. Edna Parvin, of the general office force; and Art Dimmey, in charge of mill room specifications. Each of these in addition to the pin received the company's gift of one hundred dollars, presentation being made by General Superintendent Frank Steele.

Harry Vickrey, secretary of the West American Rubber Company, has gone to Camp Lewis in the State of Washington with the National Guard, Mr. Vickrey holding the office of lieutenant-colonel.

The West American Rubber Company is now working two full shifts, 16 hours daily, and at that can hardly keep up with the rush of orders, according to Charles Lamb, vice-president and general manager. Business in all major rubber companies in Los Angeles is very good at the present time.

New Tire Company in Chile

A new tire manufacturing company is being organized in Chile. The Chilean Development Corporation, a government concern, will participate in the organization of the company, while the General Tire & Rubber Company, of Akron, will hold a sizable interest. Stock in the new concern, which will construct a factory in Santiago, will be sold to the Chilean public.

A mammoth new vulcanizer, measuring 15 feet in diameter, has been installed in the Passaic, N. J., plant of the Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc. It will be used for vulcanizing rubber-lined tanks and other equipment.

I. B. Kleinert Rubber Company has expanded its rubber footwear department at the College Point, L. I., plant. Several completely new lines of beach and house wear will shortly be introduced.

Monsanto Chemical Company has purchased a 176-acre plant site on the Detroit River in Detroit, Mich., as an initial step in its broad program of expanding manufacturing facilities.

According to reports from Tokio, the Manchuria Chemical & Industrial Co. is negotiating with I. G. Farbenindustrie of Germany for manufacturing rights to Buna. German machinery and equipment will be used to construct the necessary factories if negotiations are successful, according to the reports.

The United Rubber Workers of America (C.I.O.) will hold its fifth annual convention in Detroit beginning September 16, according to an announcement by Frank Grillo, secretary-treasurer of the union.

FIFTH ANNUAL FISHING TRIP HELD BY LOS ANGELES GROUP

The fifth annual fishing trip held by the Los Angeles Group, Rubber Division, A.C.S., on June 21 and 22, in which 44 members and guests participated, was pronounced a big success by the committees in charge. A large number of several varieties of fish was caught and the donated prizes set a record for their number. Bill Holmes (Dill Mfg.) was in charge of arrangements, assisted by L. F. McDonald (Goodrich), while Carl E. Stentz (Latex Seamless Products) was in charge of the prizes.

Participants in the trip assembled at San Pedro on the evening of June 21 and boarded the *Retreat* for Catalina. They had dinner at one of the hotels on Catalina Island and pulled out for fishing waters at 4 A.M. the following morning. They returned to San Pedro late in the afternoon of the same day.

The prize awarded for the closest guess on the number of fish likely to be caught, a 22-calibre Remington repeating rifle, went to L. Jung (U. S. Rubber). A complete fishing outfit went to Charles Lamb, Sr., for catching a 22-pound yellowtail, the largest one caught; a 5-tube radio to R. D. Bonham (Goodrich) for a 21-pound yellowtail, the second largest; and a thermos case to Ernest Brazil (Blue Star Mines) for catching the third largest.

Other prizes were won by the following: W. G. Tapping, E. H. Lewis, C. E. Stentz, C. H. Kelly, L. F. McDonald, Harold Dunbar, C. S. Newcomb, H. L. Oak, Paul Smith, James Gardner, Jack Hulsey, Paul Zeiderhock, Vic Vodra, Charles Churchill, M. Pierce, C. H. Vonder Reith, S. Davidson, A. Swanson, H. H. Simon, J. W. Goodman, G. Maasdon, and John Huff. Fred Woerner won a prize for catching the smallest fish, while a consolation prize was awarded to Harry Kincade.

Prizes distributed were made possible by the cooperation of the following concerns: American Cyanamid & Chemical Corp., Robert Badenhop Co., Blue Star Mines, Dick Bonham Fishing Equipment Co., Braun Corp., L. H. Butcher Co., B. E. Dougherty Co., Dill Mfg. Co., Farrel-Birmingham Co., Goodyear Tire & Rubber Co., C. P. Hall Co., J. M. Huber, Inc., Edmund C. Jens Co., Kirkhill Rubber Co., Meldowney & Martin, Inc., H. Muehlstein & Co., Pacific Coast Talc Co., H. M. Royal, Inc., RUBBER AGE, J. B. Ruth & Co., San Francisco Sulphur Co., United Color & Pigment Co., U. S. Rubber Co., Universal Products Co., Western Insulated Wire Co., and the Western Shade Cloth Co.

Naugatuck Aromatics, Division U. S. Rubber Co., has moved its offices from 153 Waverly Place to 12 East 22nd Street, New York City. The new offices provide larger office and factory space.

NAMES IN THE NEWS

PAUL V. MCKINNEY has left the position of Senior Fellow in the work of the Texas Gulf Sulphur Company at the Mellon Institute of Industrial Research to become director of research for the Neville Co., Pittsburgh, Penna. Prior to his recent work he was engaged in research on catalytic processes for the Phillips Petroleum Co.

H. E. BLYTHE, sales manager, Tire Department, and D. W. SANFORD, division manager for the Northeastern United States, Goodyear Tire & Rubber Co., were guests of honor at a dinner in Akron last month to celebrate the completion of 25 years of service with the company.

BRADWAY S. PHILLIPS, associated with Goodrich for the past ten years, has joined the Continental Carbon Co., New York City, as a development engineer. He will engage in carbon black development problems at the company's plant in Sunray, Texas.

E. W. REESE, affiliated with the manufacturing and sales departments of Emery Industries, Inc., Cincinnati, Ohio, for the past sixteen years, has been appointed general sales manager of that company.

FRANK A. HOWARD, president of the Standard Oil Development Co., has been elected a vice-president of the Standard Oil Co. of New Jersey, with responsibility for all chemical, research and patent matters.

W. L. WARDELL, formerly assistant general sales manager of the General Products Division of the U. S. Rubber Co., is now associated with the C. L. Miller Co., advertising agency in New York City.

HARRY K. CLARK has been elected to the office of vice-president and general manager, and ANDREW B. HOLMSTROM to the office of vice-president and works manager, of the Norton Co., Worcester, Mass.

JAMES M. SLATTERY, formerly in charge of cotton and rubber purchases for the Fisk Division of the U. S. Rubber Co., and for Fisk prior to its absorption by U. S. Rubber, has been appointed director of purchases for the Mansfield Tire & Rubber Co., Mansfield, Ohio. He spent more than 24 years with Fisk.

RICHARD E. LONG, associated with the Seiberling Latex Products Co., Barberton, Ohio, for the past twelve years, has been named general manager of the recently reorganized Eagle Rubber Co., Ashland, Ohio. He is a graduate of Stanford University.

W. L. FINGER, assistant to the general manager of the Rubber Manufacturers Association, has been granted an extended leave of absence to take charge of the rubber division of the National Defense Commission at Washington, D. C., the coordinating body for America's defense preparations.

V. J. HANSLICK, Development Department, U. S. Rubber Co., Providence, R. I., retired on August 1 after 34 years of service with that company. He became chief chemist of the old Revere Rubber Co. in 1906 and served in that capacity during the entire existence of that concern and after its absorption by U. S. Rubber. He became a member of the Providence plant's development department in 1930, after the old Revere plant in Chelsea was abandoned.

Executive Changes at Goodrich

Reorganization of duties of the executive sales staff of the tire division of the B. F. Goodrich Company has been announced by Charles B. O'Connor, general sales manager of the division. Joseph A. Hoban, formerly manager of retail sales, has been appointed to the newly-created post of merchandise manager. Wilson C. Bray, formerly manager of truck and bus tire sales, has been named assistant sales manager, and is succeeded in his old post by Joseph E. Powers, who has been New York district manager. Willis C. Behoteguy, formerly manager of the automobile tire department, is the new assistant merchandise manager, and is succeeded in his old post by Chester T. Morledge. Guy Gundaker, Jr., has been appointed to a new post, manager of budget sales, and L. A. Rosenberg has been named operating manager of the retail department.

Fire at Hollingshead Plant

A disastrous fire, which started with a series of explosions and which spread throughout the plant and to dwellings several blocks away, driving hundreds of families from their homes, practically gutted the factory of the R. M. Hollingshead Co., of Camden, N. J., on July 30. In addition to manufacturing paints, the company also produces rubber cements and a line of tire repair materials. It is understood that the plant will be rebuilt.

Union Paste Company Moves

The Union Paste Company, manufacturers of Upaco Adhesives, including a line of latex cements for the shoe and other industries, has moved its plant from Medford, Mass., to 1605 Hyde Park Avenue, Hyde Park, Mass.

JAMES E. FLOOD, chief chemist of the Whitney Blake Co., Hamden, Conn., for the past several years, has joined the John A. Roebling's Sons Company, Trenton, N. J., where he will be assistant chief chemist in the Insulated Wire Division.

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CROWN CLAY

SOUTHEASTERN CLAY COMPANY
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OBITUARIES

William B. Pratt

William Beach Pratt, authority on rubber and textiles, died at his home in Boston, Mass., on July 13, at the age of 68. He was born in Elmira, N. Y., and after being graduated from Amherst College in 1895 he attended the University of Pennsylvania as a medical student, later working with Dr. Charles E. Monroe of George Washington University.

Mr. Pratt gained recognition in three fields of industrial chemistry. Up until 1907, and again during the World War, he did outstanding work in the development of explosives. For almost twenty years thereafter he devoted most of his time to rubber research, including field work in Central America for new sources of crude rubber supply. In recent years, his time was largely consumed in textile research with a view toward developing higher-grade fabrics and, consequently, a greater market for the cotton production of the south.

One of the outstanding achievements of Mr. Pratt's career was the development of a water dispersion of crude rubber which greatly simplified the handling of this substance and has had wide application in industry. He held American, British, French and German patents on this process and was widely sought after as a consultant by rubber technologists throughout the world. He also did considerable work on other so-called artificial latices.

Funeral services were held on July 14 in the Wellesley Hills (Mass.) Congregational Church. Interment was in Wildwood Cemetery, Amherst. A widow, son and two daughters survive.

Anthony J. Dietrich

Anthony J. Dietrich, a veteran patternmaker of Akron, Ohio, widely known to the rubber industry and a pioneer of its early development work, died at the Akron City Hospital on August 3 at the age of 67 following an illness of two weeks. His wife died just six months ago.

A lifelong resident of Akron, Mr. Dietrich has been in the pattern business for almost half a century. He established his own business in 1906 and later sold it to what is now the National Rubber Machinery Co., continuing with the new owners in an executive and advisory capacity for many years. Shortly after the turn of the century Mr. Dietrich formed Ohio's first airplane parts factory and built several airplanes after John Gammeter, widely-known inventor, established a private flying field at Silver Lake. He also built the first Berloit monoplane ever made in the United States.

Mr. Dietrich witnessed many changes in the rubber industry. He made the patterns for the first tires built in Akron, and in 1934 made the pattern for one of the largest tires ever constructed, a 60.75-inch tire intended for use on tractors employed on tobacco plantations. He was one of the charter members of the Knights of St. John in Akron, joining that organization 35 years ago. Two sons and a daughter survive.

Robert M. Littlejohn

Robert Malcolm Littlejohn, secretary and director of Littlejohn & Co., Inc., of New York City, one of the leading firms engaged in the importing of crude rubber, died at his summer home, Little Cote, in Southampton, L. I., on August 6. He was 66 years of age.

Mr. Littlejohn was born in Flushing, L. I., on July 7, 1874. Early in life he joined his father, descendant of an old New York family, in the firm of James I. Townsend & Co., well-known importers of products from the Far East. Later, father and son formed their own company under the name of L. Littlejohn & Co., which co-partnership subsequently became the present firm of Littlejohn & Co., Inc. In all, Mr. Littlejohn was active in the East Indian importing business, principally rubber, for more than 40 years.

An active socialite, Mr. Littlejohn was a member of the Metropolitan Club of New York and several other clubs. He was also a member of the Society of Colonial Wars. He leaves a widow and a daughter.

Thomas O'Conor Sloane

Dr. Thomas O'Conor Sloane, scientist, inventor, author and editor, died at his home in South Orange, N. J., on August 7, after an illness of several weeks. His age was 88. Born in New York City, Dr. Sloane received his A.B. from St. Francis Xavier College in 1869, an M.A. in 1873 and an LL.D. in 1912. An M.E. degree was awarded him in 1872 by Columbia University and a Ph.D. in 1876. He served for many years as editor and consultant for various popular technical journals, and was a prolific writer on scientific subjects. Included among his books were "Rubber Hand Stamps" and "The Manipulation of India Rubber." He leaves a widow, son and daughter.

LAUNCH RUBBER STUDY IN LATIN AMERICAN COUNTRIES

Two parties of scientists, financed by the Department of Agriculture, under the $500,000 appropriation recently approved by both houses of Congress, are now in the field in South and Central America, surveying rubber producing possibilities, according to an announcement made on August 6 by Secretary of Agriculture Wallace. Latin American countries involved are said to be cooperating in the studies.

One of the exploration parties is at work in Southeastern Central America and parts of Colombia, and the other group is covering Northwestern Central America as far north as Vera Cruz, Mexico. A third party is on its way to survey an area around the headwaters of the Amazon River tributaries.

Eventually, according to Secretary Wallace, the surveys will take in an area extending from Vera Cruz to Rio de Janeiro on the southern edge of the Atlantic rain belt in South America.

Rubber Manufacturers Upheld

In a 2-to-1 decision, the United States Circuit Court of Appeals, New York District, ruled on August 8 that the United States is not a "person" within the meaning of the Sherman Anti-Trust Act and accordingly cannot sue for damages allegedly resulting from violation of that Act. The decision upholds the previous action of the United States District Court of New York which dismissed the suit filed by the Department of Justice against 17 rubber manufacturers charged with illegally fixing uniform prices in the sale of tires to the government. The original suit filed was considered a test case by the government to determine whether it could collect triple damages under civil action. As previously pointed out, the government still has the option of suing the rubber manufacturers involved under the criminal clauses of the Sherman Act.

Chicago Group Holds Outing

Approximately 75 members and guests attended the second annual outing of the Chicago Group, Rubber Division, A.C.S., which was held at the Lincolnshire Country Club, Crete, Ill., on July 20. Golf and swimming were the major sports of the day, with prizes distributed to the winners of various events. The prizes were made possible through the cooperation of the following firms: L. Albert & Son, Godfrey L. Cabot, Inc., Commerce Petroleum Co., DuPont, General Atlas Carbon Co., Herron & Meyer, J. M. Huber, Inc., International Smelting & Refining Co., Midwest Rubber Reclaiming Co., Monsanto Chemical Co., N. J. Zinc Co., A. Schulman, Inc., United Carbon Co., and Wishnick-Tumpeer, Inc.

CANADIAN NEWS

George W. Sawin, vice-president and general manager of the B. F. Goodrich Rubber Co. of Canada, Ltd., was elected president of the Rubber Association of Canada at the annual meeting of the association, held in Toronto on June 27. He succeeds A. G. Partridge. J. C. Simpson, general manager of the Dunlop Tire & Rubber Co., H. C. Jeffries, president of the Viceroy Manufacturing Co., and A. B. Hannay, were re-elected as vice-president, treasurer and manager and secretary, respectively. The following were newly elected to the association's directorate: G. W. Sawin, A. G. Partridge, J. I. Simpson, F. A. Warren, W. H. Funston, H. C. Jeffries, W. H. Miner and P. C. Jones.

Following the announcement that the government intends to call out all physically fit single men up to forty-five years of age for military training, Canadian rubber companies have been considering the policy they will follow in regard to the men affected. Rate of pay for a man in training for a short period is $1.20 a day.

Canadian Goodyear plans to make up the difference between militia pay and civilian pay of employees while they are at camp. It is not known whether this very commendable attitude will be followed generally throughout the industry as other companies have not yet announced their policies in the matter.

As a result of the very marked increase in Canada's crude rubber imports in April, the two succeeding months have shown decreases compared with the previous year.

Only a slight decrease was noted in May when 6,699,666 pounds, valued at $1,377,082, were imported compared with 6,856,788 for the previous month and 6,733,998 for May, 1939. A sharp decrease in imports was recorded in June, however, as only 2,322,194 pounds of crude were imported compared with 5,427,942 in June, 1939. Of this total, the United States contributed most—1,498,334 pounds. For the first five months of 1940 Canada imported 38,312,225 pounds of crude compared with 25,199,737 for a similar period last year.

The Northern Rubber Co., Ltd., Guelph, Ont., is operating at full strength again following a four day walkout in mid-July. The strike was called when workers failed to accept a new wage scale. The 325 employees voted to end the strike and to return to work under the same conditions as when they left, pending the decision of a board of arbitration appointed by the Federal Department of Labor at Ottawa.

North American Cyanamid, Ltd., Niagara Falls, Ontario, subsidiary of American Cyanamid, has awarded contracts for construction of an office building and two smaller buildings at the proposed $3,000,000 plant to be erected near Niagara Falls. The new plant will enable the company to double its capacity for production of acrylonitrile (vinyl cyanide) which is used with butadiene to produce synthetic rubber.

The general contract for a two-story and basement extension to the Dominion Rubber plant at Papineau and Craig Streets, Montreal, has been awarded to Anglin-Norcross Quebec, Ltd. The addition will be fifty-seven by fifty-nine feet with reinforced concrete foundation and brick walls, costing $40,000. Contract for construction of a new entrance and interior alterations in the present building has been let to Richard and E. J. Ryan for $10,000.

Work has commenced on three new buildings of the Canada Wire and Cable Company at Montreal. The structures will be of brick, concrete and steel, and will provide 160,000 additional feet of floor space. The new additions will cost approximately $160,000.

Charles Shaw Band, vice-president of Gutta Percha and Rubber, Ltd., Toronto, has been elected a director of the Canadian Surety Company. Mr. Band is a director of many other Canadian companies.

Barclay Read, well known in Canadian rubber circles through his long association with the rubber chemical sales division of Canadian Industries, Ltd., has left to enter the real estate business in Wilmington, Delaware.

Ralph F. Wolf has joined the staff of the Standard Oil Development Company and will work on the compounding and commercial processing of synthetic rubbers at the Esso Laboratories, Elizabeth, N. J.

Mr. Wolf, a native of Akron, has been engaged in technical work with the B. F. Goodrich Company since his graduation from the Catholic University of America in 1932. Since September, 1939, he has been assistant technical manager of the Canadian Goodrich factory. He is author of two books and a number of magazine articles dealing with the history of the rubber industry and in recent months has been Canadian correspondent for RUBBER AGE.

GEORGE W. SAWIN
heads Canadian Rubber Association

News Briefs

Hero Manufacturing Co., Inc., Middleboro, Mass., has introduced the "Pick-Kwik," a molded plastic rubber band dispenser, handy for both home and office use. A clever internal spring and push device forces the bands up near the top of the dispenser at which point individual bands are picked up through a convenient groove.

U. S. Rubber Company is consolidating its merchandising efforts for all of its four tire brands—U. S., Fisk, G & J and Gillette—at its main executive office at 1230 Sixth Ave., New York City. In addition to consolidated selling effort, selling expenses will be appreciably reduced.

A clever series of two-color bleed page advertisements featuring synthetic rubber products of the Chicago Rawhide Mfg. Co., Chicago, has been launched for that company by Wm. L. Diener, Inc., advertising agency, also of Chicago. The campaign is at present directed to the aviation industry.

An appropriation of $500,000 to investigate the possibilities of crude rubber cultivation in Latin American countries has been approved by both houses of Congress. Originally, the sum of $1,000,000 was asked. Since the appropriation requested was part of an Administration bill, the money will be available immediately.

An expansion program to provide increased warehouse space for tires and tubes has been launched at the Gadsden, Alabama, plant of the Goodyear Tire & Rubber Co.

Stauffer Chemicals

TIRE BRAND
Commercial Rubbermakers' Sulphur, 99½% Pure

TUBE BRAND
Refined Rubbermakers' Sulphur, 100% Pure

CRYSTEX (INSOLUBLE) SULPHUR

SULPHUR CHLORIDE

CAUSTIC SODA

CARBON BISULPHIDE

CARBON TETRACHLORIDE

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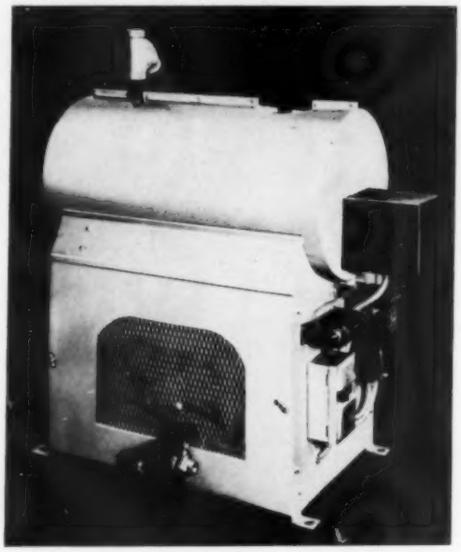
230 NO. MICH. AVE., CHICAGO, ILL.
624 CALIFORNIA ST., SAN FRANCISCO, CAL.
555 SO. FLOWER ST., LOS ANGELES, CAL.
424 OHIO BUILDING, AKRON, OHIO
FREEPORT, TEXAS APOPKA, FLORIDA

NEW EQUIPMENT

Royle Heating and Circulating Unit

The Royle heating and circulating system for heat-transfer media, made by John Royle & Sons, Paterson, N. J., was designed primarily for use with the company's extruding machines to enable users to arrive at

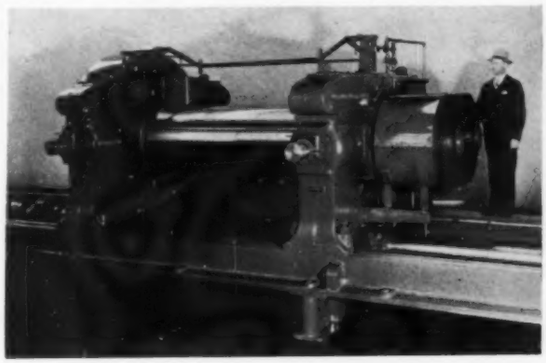


higher jacket temperatures than before without resorting to high pressure. While its first field of use was as an accessory to Royle extruders in the plastics industry, the unit may be applied also to various types of hydraulic presses, molds and other machines where a positive circulation of thermostatically regulated heat-transfer media is indicated. Basically, the standard unit comprises a tank-type reservoir heated by a thermostatically controlled 6,000 watt electric immersion heater, with a special motor-driven hot oil pump, strainer and automatic pressure relief valve. Immersion heater elements of higher capacity, up to 11,000 watts, are also available. The tank is fully insulated with glass wool, covered with a steel jacket and mounted on a sturdy welded steel frame. The enclosed base frame houses motor and pump and is provided with removable side panels for ready access. Interior piping is insulated. The complete unit is 37 inches in height, requires 19 x 36 inches of floor space, and has a tank capacity of 10 to 11 gallons.

Extra Heavy 84-Inch Mill

Said to be the largest and most rugged mill ever built, a new 28 x 84-inch rubber mill has been introduced by the Farrel-Birmingham Co., Inc., Ansonia, Conn. It was made from entirely new patterns and incorporates new proportions to provide the most advantageous distribution of metal for maximum strength and rigidity. The new mill is one of three designed primarily as sheeting mills to handle with greater facility the large batches mixed in the Size 11 Banburys. The three mills are arranged in a line with a Banbury mounted over each. They are driven by a

600 h.p., 514 r.p.m. motor, through an enclosed herringbone gear reduction drive and line shafting. The rolls of the new mill, made of hard chilled iron, are 28 inches in diameter, with an 84-inch face, and have 18-inch diameter journals. They are corded and fitted with internal spray pipes and overflow nozzles. The housings, designed especially for the 28-inch diameter rolls, are of Meehanite. The roll journal boxes, also of



Meehanite, are fitted with full circle brass liners. They are water-cooled and force-feed lubricated from a central lubricating system. The mill is provided with a patented shear pin type of safety on the adjusting screw, designed to break at a predetermined load to prevent possible breakage of other parts should the mill accidentally be overloaded. A pull-back, integral with this safety feature, permits adjustment of the rolls forward as well as back. Safety bars and switch to apply dynamic braking on the driving motor for emergency stopping are also provided.

Palmer Dial Thermometer

Said to be sensitive and quick-acting a new mercury-actuated dial thermometer, with an 8-inch case, has been introduced by the Palmer Company, 2501 Norwood Avenue, Cincinnati, Ohio. All working parts of

the new dial thermometer have been made to operate freely and to register accurate temperature. It has a non-reflecting white dial, with clear scale graduations, and is easily read. Actual service tests are said to have indicated that the new instrument is thoroughly reliable.

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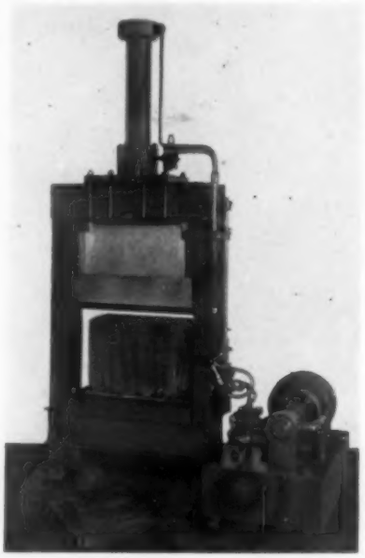
Spadone Crude Rubber Bale Cutter

A new crude rubber bale cutter, said to be a highly efficient machine for cutting bales of rubber in thin slices or small pieces preparatory to milling, has been introduced by the Spadone Machine Co., Inc., 122 East 25th St., New York City. The new cutter is hydraulically operated. It consists of a sturdy frame



fitted with suitable slides for guiding the knife. Mounted on top of the frame is a cylinder having a double-acting ram. The cutting blade or knife is bolted to a heavy wedge-shaped casting which in turn is fastened to the ram. In operation the knife makes its down stroke cutting without the aid of water, producing a clean, smooth cut and returning automatically to its original position. Slices as thin as 1½ inches can be cut. The daylight measuring from the table on which the bale rests to the knife in its extreme elevated position is 23 inches, but this measurement can be reduced by an adjustable stop. The hydraulic unit, which is entirely self-contained and is easily accessible, consists of a 5 h.p. electric motor, pump and adjustable pressure valve which are mounted on a 30-gallon tank. The start and stop control lever is conveniently placed on the side frame and to the front so that the operator is in a position to watch the cutting action. The knife operates on an unusually low pressure and makes a complete cutting cycle in approximately 9 seconds. The new cutter weighs approximately 3,000 pounds, measures 60 x 36 inches with 9 foot head room, and does not require a foundation.

BRIEFS . . . .

The **Opaco Safety-Fill Nozzle,** a new gasoline automatic shut-off hose nozzle which is said to prevent spilling and wasting of gasoline, has been introduced by the Opaco Division, American Machine & Metals, Inc., East Moline, Ill.

•

The molding of accurately threaded plastics parts, such as bushings, knobs, ferrules, etc., is said to be speeded up considerably by the use of a new completely **automatic molding machine** introduced by the F. J. Stokes Machine Co., Philadelphia, Penna.

REVIEWS

BOOKS

Manual de la Industria de la Goma. By Luis Pascual Majias Lopez. Published by *La Goma,* Calle de Moncada, 4, Tda., Barcelona, Spain. 6½ x 9½ in. 362 pp. $3.00. (In Spanish only).

When this book was reviewed in the April, 1940, issue of this journal we stated that it was a condensed version in Spanish of the "Encyclopedie du Caoutchouc et des Industries qui s'y Rattachent," the French manual issued several years ago by the *Revue Generale du Caoutchouc.* We arrived at this conclusion because some of the identical illustrations were used and many of the chapter heads were the same. It now develops, however, that although the publishers of the Spanish manual purchased a number of the engravings from the publishers of the French manual, and despite the similarity of chapter heads, the Spanish manual is a completely original work prepared by Senor Lopez. We are glad to bring this version to the attention of our readers.

The *Manual de la Industria de la Goma* consists of 49 chapters, 37 devoted to rubber and the balance to applications of latex. In addition, there is a section giving a number of tables of interest to compounders of rubber products, including data on vulcanization temperatures, types of crude rubber and commercial solvents. The entire range of rubber, from collection through to the manufacture of the finished product, is covered in the manual. After discussing methods of cultivation, theories of vulcanization, vulcanization processes, compounding ingredients, use of factice, and recovery of solvents, the author launches into a number of chapters each devoted to the manufacture of some other rubber product, including tires and tubes, wires and cables, footwear, thread, and hard rubber goods.

Although formulas are given throughout the book in connection with the manufacture of specific products, there is in addition a complete chapter devoted to general formulas. In many cases alternative formulas are given so that the user of the manual may do his own experimenting to determine which of the formulas given is best suited for his purpose. Incidentally, the manual is the first comprehensive work on rubber which has yet appeared in the Spanish language.

•

Annual Survey of American Rubber Chemistry for 1937. By Webster N. Jones. Published by Carnegie Institute of Technology, Pittsburgh, Penna. 6 x 9 in. 64 pp. 75c per copy.

Somewhat delayed, this survey has just made its appearance. It follows the same style of previous annual reviews, giving a brief history of American rubber chemistry and then launching into a discussion of the developments which occurred in 1937 in the fields of properties and structure of rubber, compounding ingredients, control and testing, reclaiming, latex and rubber dispersions, cements and adhesives, rubber technology in general, synthetic rubber and rubber-like products, and derivatives of rubber. Brief references only are made to the various developments, with bibliographical references given in each case to enable the reader to secure further information if desired.

These annual surveys have had an interesting, if precarious, career. For ten years, from 1925 to 1935, they were published under the sponsorship of the National Research Council, edited by Clarence J. West. They were incorporated as part of the Council's annual surveys of American chemistry. In 1936, however, the Council dropped publication of these surveys due to financial con-

Scrap Rubber

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By Frederick Marchionna
Bibliography of latex patents and literature to June, 1932. Price: $15.00

LATEX AND RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS (Vols. II & III)
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Bibliography of latex patents and literature from June, 1932 to January, 1937; rubber derivatives to January, 1937. Price: $20.00

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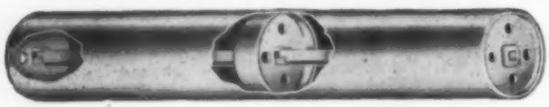

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ditions. A survey for the year of 1936 did make its appearance, late in 1937, as a separate booklet.. It was sponsored by the City of Pittsburgh, and was edited by Dr. Jones with the help of several assistants furnished by the Works Progress Administration.

The current study, however, is published as an Engineering Bulletin (No. 86) by Carnegie Institute. It was produced by the Institute's Department of Printing as a senior student project. It is to be hoped that the Institute will see fit to continue publishing the surveys as such a project so that surveys for the years of 1938 and 1939, as well as subsequent years, will become part of the industry's technical literature.

●

Synthetic Rubbers: A Review of Their Compositions, Properties, and Uses. (Circular C427). By Lawrence A. Wood. Published by the National Bureau of Standards, Department of Commerce, Washington, D. C. 5¾ x 9¼ in. 30 pp. Available from the Superintendent of Documents, Washington, D. C., at 10c per copy.

This booklet represents the most comprehensive survey and summary made to date on the varieties of so-called modern synthetic rubbers. Chloroprene polymers, butadiene polymers, organic polysulfides, isobutene polymers, and plasticized vinyl chloride polymers are each discussed separately. The balance of the booklet is devoted to a comparison of properties, applications, production figures and prices, and a complete bibliography, listing 228 references, divided into sections covering each of the several varieties of synthetic rubber, each of which is again divided into sections covering general survey, chemistry, polymerization and structure, compounding and vulcanization, properties and special applications.

Of special interest is the inclusion of several specially-compiled tables showing, respectively, the varieties of synthetic rubber available, the chemical structures of the different varieties, densities of unvulcanized materials, refractive indices of unvulcanized materials, maximum tensile strengths and corresponding elongations, and swelling of vulcanized compounds in liquids. Also of special interest is a discussion on the superiorities of synthetic rubbers over natural rubber. Every chemist in the rubber industry should have a copy of this booklet.

●

Aerosphere, 1939. Edited by Glenn D. Angle. Published by Aircraft Publications, 370 Lexington Ave., New York City. 8½ x 11½ in. 1420 pp. $15.00 (plus shipping charges).

This is the first of a series of annual directories intended to serve as a complete and convenient reference to the world-wide aeronautical industry. Not only is it one of the most comprehensive directories of any kind we have seen, but it is also one of the most attractively put-together manuals. Never before have the statistics and data on any world-wide industry been put between two covers so well.

Adopting the theory that the user of a trade directory is either seeking information about some firm, or is looking for the names of firms producing some product in which he is interested, the directory is divided into four convenient sections, *i.e.*, World's Aircraft Engines, Modern Aircraft, Statistics and Directory. The first section is an alphabetically arranged compilation of available data on the aircraft engines of the world; the second describes and illustrates all known current types of aircraft; the third contains statistics of various sorts of interest to the industry; and the fourth is a directory arranged alphabetically by country, with each country divided into two sections, the first an alphabetical list of firms and individuals, with full names and addresses, and the second an alphabetical list of products with the manufacturers thereof listed.

Although this comprehensive directory is primarily edited for the members of the aeronautical industry itself, rubber manufacturers with products applicable for use in that industry will find it of real value, whether their sales are restricted to the domestic market or embrace world-wide coverage.

BOOKLETS, CATALOGS, Etc.

The Particle Size and Shape of Colloidal Carbon as Revealed by the Electron Microscope. Columbian Carbon Co., 41 East 42nd St., New York City. 5½ x 7¾ in. 56 pp.

Issued as Vol. II of "Columbian Colloidal Carbons," this booklet presents a review of all previous work designed to determine the particle size and shape of colloidal carbon and so master the mystery of colloidal carbon-rubber reinforcement, describes the various forms of electron microscopes which have been constructed in recent years, and then gives the results of the first of a series of investigations being conducted by W. L. Wiegand and his associates with the electron microscope as applied to Micronex carbon black. The conclusions drawn from this initial investigation indicate that all previous theories on the particle diameter of carbon black may have to be considerably revised. The results of the investigation are presented and analyzed elsewhere in this issue of RUBBER AGE.

•

The Story of St. Joe Electro-Thermic Zinc. St. Joseph Lead Co., 250 Park Avenue, New York City. 8½ x 11 in. 24 pp.

This booklet contains reprints of twelve advertisements which tell the story of St. Joe Electro-Thermic Zinc from ore to metal. The purpose of the series was to impress on the zinc consumers' mind the fact that the company's zinc and zinc oxide originates in its own mines in northern New York State. Additional data and statistics of interest to zinc consumers, including that pertaining to production, imports, exports, and distribution by industries, are also given. Several interesting photographs taken at the company's plant in Josephtown, Penna., add to the booklet's attractiveness.

•

New Worlds in Engineering. Chrysler Corporation, Detroit, Mich. 8½ x 11 in. 96 pp.

This colorful booklet, issued as a memento on the occasion of the dedication of Chrysler's new and enlarged engineering and research laboratories in Detroit recently, gives a clear and comprehensive conception of the company's engineering, both its contributions in the past and its promise for the future. Various pieces of equipment and apparatus in the new laboratories are described and illustrated. In addition, the manufacture of a modern Chrysler is pictorially traced from start to finish. The importance of research and testing to the performance of the finished automobile is stressed throughout the booklet.

•

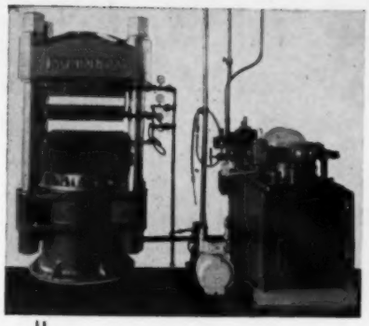
Hedging. Merrill Lynch, E. A. Pierce & Cassatt, 40 Wall St., New York City. 7 x 10 in. 16 pp.

Application of hedging operations as a means of protecting actual or potential inventories against price fluctuations is explained in this booklet, with several theoretical and actual "case histories" given. The theory of hedging is discussed, as are some often overlooked points concerning futures contracts on various exchanges. A table on "Basic Facts of Commodity Trading" adds interest to the booklet.

•

The Care and Treatment of Rubber Flooring. British Rubber Publicity Association, 1, Albert Mansions, Lansdowne Road, Croydon, Surrey, England. 5½ x 8½ in.

Proper methods of washing and polishing rubber floors are given in this booklet. The point is stressed that only a cleanser or polish recommended by the manufacturer of the flooring should be used, and that all "home remedies" should be discarded or given thorough tests before application.



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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, AUGUST 9, 1940

Crude Rubber

AFTER hovering around a 20.75 level for several days in mid-July, the price for spot on the Exchange dropped to 20.50 on July 15 following the announcement that domestic consumption for June amounted to only 46,506 tons, the lowest monthly figure since July, 1939, and then started moving upward until it reached 22.25 on August 18, high for the period. Increased factory support was largely responsible for the higher price trend. The price continued above the 22-cent level for several days and then dropped sharply to 20.50 on July 29 following signs of trouble relative to the clearing out of some 150 July rubber contracts on which the Board of Governors of the Exchange took a hand. Serious trouble, however, was avoided at the last minute when it was found that sufficient rubber of exchange grade was available to satisfy all these contracts by actual delivery, and no official Exchange action was necessary. Due to this situation, prices drifted aimlessly. Since July 29, the price trend has been definitely downward, the low of 19.57 for the period being reached today (August 9). Quotations in the outside market, Exchange, London and Singapore, follow:

As of August 9

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.20¼
September	—	@	.19⅝
November-December	—	@	.19
No. 2	—	@	.19½
No. 3	—	@	.19¼
No. 4	—	@	.19
Thin Latex Crepe	—	@	.19½
Thick Latex Crepe	—	@	.19½
Brown Crepe, No. 1	—	@	.18½
Brown Crepe, No. 2	—	@	.18¼
Amber Crepe, No. 2	—	@	.18½
Amber Crepe, No. 3	—	@	.18¼
Brown Crepe, Rolled	—	@	.15½

Latex—

Normal, per lb., carload lots	—	@	.24½

Paras—

Up-River, fine	—	@	.19⅛
Acre Bolivian, fine	—	@	.19¼

Balata

Brazilian block	—	@	.14

LONDON MARKET

Standard Smoked Sheets—Buyers—August 9

September	12 1/8	@	13 7/16d
October-December	12 1/4	@	12 13/16d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—August 9

August	—	@	10 7/8d
October-December	—	@	9 31/32d

Scrap Rubber

The scrap rubber market was quiet but steady in the past several weeks, according to leaders in the trade. As expected, the new license regulations have not affected any of the export business, which, however, is not very large. Although prices remain fairly steady, an increase on auto tire peeling stocks was put into effect since our last report. Current quotations follow:

(Prices to Consumers)

Auto tire peelings, ton	22.00	@	23.00
Mixed auto, ton	13.50	@	14.00
Beadless tires, ton	18.00	@	19.00
Clean solid truck tires, ton	30.00	@	32.50
Boots and shoes, ton	21.00	@	22.00
Arctics, untrimmed, ton	18.00	@	19.00
Inner tubes, No. 1, lb.	.10	@	.11
Inner tubes, No. 2, lb.	.04½	@	.04⅝
Inner tubes, Red, lb.	.04½	@	.04¾

Reclaimed Rubber

The reclaim business is in the usual summer doldrums, with reclaimers looking for a pick-up in the early Fall. The licensing regulations pertaining to export shipments of reclaimed rubber are said to being taken in stride by the trade, with very little delay currently encountered on such shipments. Consumption of reclaim in June was estimated at 15,844 tons, a gain of 0.8% over the 15,719 reported for May. There has been no change in the price structure since our last report.

Shoe

Unwashed, lb.	.06½	@	.06¾
Washed, lb.	.10	@	.10¼

Tube

No. 2 (Compounded), lb.	.09	@	.10
Red Tube, lb.	.09	@	.09¼

Tires

Black (acid process), lb.	.07	@	.07¼
Black, selected tires, lb.	.06	@	.06¼
Dark Gray, lb.	.09¼	@	.10
White, lb.	.12½	@	.14
Truck, Heavy Gravity, lb.	.05½	@	.06
Truck, Light Gravity, lb.	.07	@	.07½

Miscellaneous

Mechanical blends, lb.	.04½	@	.05

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3, lb.	.29½	@	.29¾
Peeler, carded, 23/4/3, lb.	.30½	@	.30¾
Peeler, carded, 15/3/3, lb.	.27½	@	.27¾
Peeler, carded, 15/4/2, lb.	.27½	@	.27¾
Peeler, carded, 13/3/3, lb.	.26½	@	.26¾
CHAFERS			
Carded, American, 1 3/16", lb.	.29½	@	.30
Carded, American, 1", lb.	.19	@	.25½

Cotton

The cotton market was largely a dull affair throughout the latter part of July and the first week in August, with orders generally small and routine. Consequently, the price started to move downward slowly and with but a few exceptions continued that trend throughout the period, high being a price of 10.58 on July 10 with a low of 9.98 reached today (August 9). The price was strengthened somewhat in mid-July, particularly in futures, when indications were received from Washington that the government was likely to make a relatively high loan on this season's crop, between 11 and 12 cents. It weakened shortly thereafter, however, when revised estimates set the probable loan at slightly above 10 cents. The actual rate, announced by the Department of Agriculture today (August 9), was 9.80 cents a pound for middling 15-16-inch staple at all Gulf and Pacific Coast ports on a net weight basis, with the loan elsewhere varying from 9.16 to 9.90 cents, depending on location. Quotations for middling uplands on the Exchange follow:

	July 9	August 9		
	Close	High	Low	Close
October	9.33	9.42	9.36	9.36
December	9.18	9.32	9.28	9.31
March	...	9.13	9.08	9.11

Sheetings

48x40	36	in.	5.50	lb.	— @	.037⅛
40x40	36	in.	6.15	lb.	— @	.03½
40x36	36	in.	6.50	lb.	— @	.03⅜
48x48	40	in.	2.50	lb.	— @	.07⅞
48x48	40	in.	2.85	lb.	— @	.07
56x60	40	in.	3.60	lb.	— @	.06¾
48x44	40	in.	3.75	lb.	— @	.05½

Ducks

Enameling (single filling), lb.	.22½	@	.25½
Belting and Hose, lb.	.26¾	@	—
Single filling, A grade, lb.	.10¾	@	.11¾
Double filling, lb.	.11¾	@	.12¾

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 Tons

FROM JULY 10 TO AUGUST 9

Date		Spot	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Sales
July	10	20.75	20.50	20.01	19.01	18.45	18.30	18.15	18.05	17.95	17.85	17.80	17.80	31
	11	20.75	20.50	20.05	19.05	18.45	18.32	18.20	18.10	18.02	17.95	17.90	17.90	50
	12	20.75	20.60	20.25	19.25	18.70	18.57	18.45	18.35	18.27	18.20	18.15	18.15	52
	13	—	—	—	—	—	—	—	—	—	—	—	—	—
	14	—	—	—	—	—	—	—	—	—	—	—	—	—
	15	20.50	20.55	19.45	19.15	18.65	18.52	18.40	18.37	18.36	18.35	18.35	18.35	66
	16	21.00	21.05	21.04	19.29	18.85	18.69	18.54	18.50	18.46	18.42	18.42	18.42	89
	17	21.75	21.90	19.90	19.47	19.16	18.95	18.75	18.71	18.67	18.63	18.63	18.63	47
	18	22.25	22.30	19.95	19.48	19.08	18.85	18.62	18.56	18.49	18.42	18.42	18.42	142
	19	22.25	22.25	19.70	19.40	19.00	18.85	18.70	18.64	18.57	18.45	18.45	18.45	212
	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	21	—	—	—	—	—	—	—	—	—	—	—	—	—
	22	22.25	22.25	19.70	19.40	19.00	18.80	18.60	18.55	18.50	18.45	18.45	18.45	10
	23	22.10	22.00	19.76	19.47	19.06	18.85	18.70	18.65	18.55	18.50	18.50	18.50	49
	24	21.75	21.78	19.71	19.44	19.10	18.87	18.63	18.59	18.49	18.44	18.34	18.34	39
	25	22.13	22.38	19.78	19.51	19.10	18.89	18.73	18.67	18.57	18.52	18.42	18.42	73
	26	22.00	22.25	19.75	19.49	19.15	18.89	18.65	18.60	18.50	18.40	18.35	18.35	73
	27	—	—	—	—	—	—	—	—	—	—	—	—	—
	28	—	—	—	—	—	—	—	—	—	—	—	—	—
	29	20.50	—	19.81	19.51	19.20	18.99	18.78	18.71	18.65	18.55	18.45	18.45	112
	30	20.00	—	19.83	19.51	19.25	19.11	18.97	18.88	18.78	18.73	18.58	18.58	94
	31	19.87	—	19.62	19.37	19.12	19.01	18.90	18.81	18.75	18.69	18.54	18.54	336
Aug.	1	19.75	—	19.58	19.33	19.08	18.94	18.81	18.73	18.66	18.61	18.46	18.46	2
	2	19.87	—	19.65	19.50	19.25	19.15	19.05	18.95	18.90	18.85	18.70	18.70	26
	3	—	—	—	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—	—	—	—
	5	19.87	—	19.83	19.68	19.43	19.34	19.25	19.15	19.06	18.98	18.83	18.83	96
	6	19.87	—	19.91	19.66	19.41	19.33	19.26	19.15	19.06	18.98	18.83	18.83	24
	7	19.75	—	19.72	19.45	19.22	19.14	19.05	18.99	18.92	18.86	18.71	18.71	25
	8	19.60	—	19.62	19.37	19.12	19.06	18.99	18.91	18.85	18.79	18.64	18.64	32
	9	19.57	—	19.57	19.32	19.07	19.03	18.99	18.92	18.85	18.79	18.69	18.59	74

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CHEMICAL MARKETS

New York, July 11, 1940
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.30
A-10	lb.	.31 @	.35
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.65
Butyl Zimate	lb.	2.50 @	—
Captax	lb.	.50 @	.57
Crylene	lb.	.55 @	.65
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.50 @	.65
Ethyl Zimate	lb.	2.50 @	—
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.40 @	.50
Hepteen	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.14 @	—
Witco		.15 @	—
Monex	lb.	— @	2.35
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	2.50 @	2.75
R-23	lb.	.40 @	—
RN-2	lb.	1.40 @	1.80
RN-2 Crystals	lb.	2.00 @	2.25
Rotax	lb.	.60 @	.65
Safex	lb.	1.20 @	1.30
SPDX	lb.	.70 @	.75
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.25
Thiocarbanilid, drums	lb.	.24 @	.30
Thiurad	lb.	— @	2.35
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	2.35 @	—
Ulto	lb.	1.50 @	1.75
Ureka	lb.	.60 @	.75
Ureka Blend B	lb.	.60 @	.75
Ureka C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Zimate	lb.	2.35 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb.	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Guignet's Green	lb.	.70 @	—
Reds			
Antimony crimson, 15/17	lb.	.45 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05¼ @	.05½
Cryptone CB, No. 21	lb.	.05¼ @	.05½
Cryptone, ZS-230	lb.	.07½ @	.07¾
Cryptone, ZS-86	lb.	.07½ @	.07¾
Lithopone			
Albalith, black label—11	lb.	.03¾ @	.04
Azolith	lb.	.03¾ @	.04
Ray-bar	lb.	.05¼ @	.05¾
Ray-cal	lb.	.05¼ @	.05¾
Rayox	lb.	.13 @	.14
Titanox A	lb.	.13 @	.14
Titanox B	lb.	.05¼ @	.05¾
Titanox C	lb.	.05 @	.05½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06¼ @	.06½
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U. S. P.—7. bbls.	lb.	.09½ @	.09¾
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.55 @	.65
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow	lb.	.02925 @	—
Certified	lb.	.02925 @	—
Certified Spheron	lb.	.02925 @	—
Continental	lb.	.02925 @	—
Disperso	lb.	.02925 @	—
Dixiedensed	lb.	.02925 @	—
Dixiedensed 66	lb.	.02925 @	—
Excello	lb.	.02925 @	—
Fumonex	lb.	.03 @	—
Fumonex Beads	lb.	.03 @	—
Gastex	lb.	.03 @	—
Kosmobile	lb.	.02925 @	—
Kosmobile 66	lb.	.02925 @	—
Micronex (Amarillo)	lb.	.02925 @	—
Micronex Beads (Amarillo)	lb.	.02925 @	—
Pelletex	lb.	.03 @	—
P-33	lb.	.0475 @	—
Supreme	lb.	.02925 @	—
Thermax	lb.	.02 @	—
Wyex	lb.	.02925 @	—

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@24.50
Asbestine	ton	13.00	@15.00
Barium carbonate (98-100%)	ton	—	@ —
Barytes	ton	23.65	@31.15
Bentonite	lb.	.02	@ .03
Blanc fixe dry f.o.b. works	ton	60.00	@65.00
Calcene	ton	37.50	@45.00
Catalpo (fact.)	lb.	.02	@ —
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40	@60.00
heavy	ton	45.00	@55.00
Clay, Aerfloted, Suprex	ton	10.00	@22.00
Crown (f.o.b. plant)	ton	10.00	@ —
Dixie	ton	10.00	@24.50
Langford	ton	—	@ 8.50
McNamee	ton	10.00	@22.50
Par	ton	10.00	@22.50
Witco	ton	10.00	@ —
Cotton Flock (Dark)	lb.	.10½ @	.13
Kalite No. 1	ton	24.00	@50.00
Kalite No. 3	ton	34.00	@60.00
Kalvan	ton	95.00	@121.00
Magnesium carbonate	lb.	.07½ @	—
Mica	ton	35.00	@44.00
Mineralite	ton	—	@30.00
Pyrax A	ton	6.00	@20.00
Rottenstone (powdered)	lb.	.02½ @	.05
Silene (calcium silicate)	lb.	.04 @	.045
Soapstone, powdered	ton	16.00	@22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	25.00	@45.00
Whiting, commercial	ton	17.00	@18.00
Columbia Filler	ton	9.00	@14.00
English Cliffstone	ton	33.00	@43.00
Witco	ton	6.00	@ —
Wood Flour	ton	20.00	@25.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	23.00	@42.00
Black Diamond	ton	25.00	@ —
Genasco, solid (factory)	ton	[illegible]	@27.00
Hard Hydrocarbon	ton	23.00	@42.00
Parmr, solid	ton	21.00	@27.00
Pioneer, MR, solid	ton		

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dor No. 5145	lb.	2.00 @	—
Areaklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.47
Santomerse S (dispersing, wetting, penetrating and stabilizing agent)	lb.	.11 @	.25
Sunproof	lb.	.22 @	.27
Sponge Paste	lb.	— @	.18
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.52 @	.61
Ty-Ply R (and S)	gal.	6.75 @	10.75
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53 @	2.78
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.10¾ @	.13¼
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.09 @	—
Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	3.55
Soda Ash, 58%, C.L.	cwt.	— @	2.35
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Para-Flux	gal.	.17 @	.18
Para-Lube	lb.	.046 @	.048
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	— @	—
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.50
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon tetrachloride	gal.	.73 @	1.065
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.41 @	.50
Ethylene dichloride	lb.	.06 @	.07
Plastogen	lb.	.07¼ @	.12
Reogen (drums)	lb.	.11½ @	.26
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.08½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¾ @	—
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50 @	1.95
Exel	lb.	1.00 @	1.40
Gel	lb.	.57 @	.73
Hipar	lb.	.65 @	.92
Powder	lb.	.52 @	.64
Resin	lb.	.52 @	.64
Resin D	lb.	.52 @	.64
White	lb.	1.25 @	1.60
Albasan	lb.	.70 @	.75
Antox	lb.	— @	.56
B-L-E	lb.	.52 @	.61
Flectol B	lb.	.52 @	.65
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone	lb.	.52 @	.63
Oxynone	lb.	.64 @	.80
Retardex	lb.	.35 @	.40
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stanilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Areaklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Mold Paste	lb.	.12 @	.18
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.17 @	—
Black	lb.	.08 @	.12
White	lb.	.08½ @	.12
Brown	lb.	.08 @	.10½
Neophax	lb.	.09¼ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.035 @	.04
Sulfur flour,			
Refined, 100% pure (bags)	cwt.	2.50 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

STATISTICS

Crude Rubber — Latex & Guayule — Reclaim — Tires & Tubes — Automobiles — Rims — Gasoline — Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1939	469,803	167,558,245	15.92	13,125	5,832,618	19.84	456,678
1939:							
Apr.	30,836	10,400,125	15.06	440	151,644	15.38	30,396
May	42,998	15,041,433	15.62	496	180,091	16.20	42,502
June	32,437	11,403,150	15.69	413	147,910	16.00	32,024
July	34,288	12,071,105	15.72	440	164,428	16.69	33,848
Aug.	35,794	12,702,958	15.84	267	89,741	15.01	35,527
Sept.	35,006	12,667,740	16.16	1,472	659,055	19.98	33,534
Oct.	42,784	15,211,621	15.87	5,886	2,881,172	21.85	36,898
Nov.	39,422	14,555,150	16.48	1,228	539,763	19.63	38,194
Dec.	68,384	25,861,354	16.88	1,116	529,759	21.20	67,268
1940:							
Jan.	68,962	26,314,500	17.03	955	447,673	20.92	68,007
Feb.	40,603	15,578,517	17.13	1,291	599,819	20.74	39,312
Mar.	55,517	21,845,290	17.57	975	447,460	20.49	54,542
April	66,622	26,176,442	17.54	565	252,638	19.98	66,057
May	47,559	18,511,955	17.38	821	301,914	16.41	46,738

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1939	2,232	463,345	694	265,553	6,640	1,603,418	27,438	10,467,552
1939:								
Apr.	180	24,584	59	18,170	281	72,024	1,018	360,739
May	102	22,347	56	16,359	645	161,745	2,786	1,067,682
June	91	19,879	119	33,876	597	122,087	1,836	694,863
July	150	32,626	39	18,813	663	141,540	2,934	1,064,927
Aug.	178	38,687	28	8,689	742	208,156	2,614	1,001,013
Sept.	133	30,091	36	19,682	479	100,285	2,525	965,615
Oct.	282	61,376	107	43,267	465	127,084	2,555	968,207
Nov.	214	46,558	96	37,858	289	74,358	3,071	1,227,788
Dec.	236	51,521	64	38,781	477	126,548	2,779	1,127,924
1940:								
Jan.	128	27,901	34	19,478	612	155,570	3,410	1,412,728
Feb.	314	70,251	55	26,420	461	134,878	2,171	947,524
Mar.	365	81,181	45	20,895	542	162,493	3,376	1,473,056
April	314	65,313	50	18,289	506	176,064	3,763	1,608,156
May	289	57,578	60	20,503	495	158,713	3,584	1,523,879

(1) Weight given in pounds of dry rubber contained in latex.
Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

Figures on Monthly Basis

	1933	1934	1935	1936	1937	1938	1939	1940
Jan.	22,645	39,190	46,636	48,631	50,879	31,265	47,387	54,978
Feb.	21,392	40,515	42,720	36,841	51,950	25,357	43,422	49,832
Mar.	17,843	47,003	42,153	42,813	54,129	32,389	51,416	50,192
Apr.	25,928	44,853	44,247	52,031	51,859	29,730	45,268	50,103
May	44,074	42,918	41,101	50,612	51,795	30,753	45,484	51,619
June	50,743	40,147	36,156	52,772	51,860	32,540	48,438	46,506
July	49,614	32,553	35,917	48,250	43,703	34,219	44,975	.....
Aug.	44,428	33,216	38,775	46,777	41,506	40,552	51,740	.....
Sept.	35,281	30,258	37,086	46,449	43,945	40,183	51,402	.....
Oct.	31,543	31,253	41,969	49,637	38,754	42,850	57,155	.....
Nov.	28,831	34,748	42,310	50,433	34,025	49,050	55,677	.....
Dec.	28,757	36,569	42,474	49,754	29,195	48,143	49,636	.....
Tot.	401,079	453,223	491,544	575,000	543,600	437,031	592,000	.....

Note: The above figures are based on the annual surveys conducted by the Leather and Rubber Division, Bureau of Foreign & Domestic Commerce, Washington, D. C., with the exception of those for the current year which are estimates made by the Rubber Manufacturers Association. They are revised frequently and the latest available issue should always be consulted for the most reliable figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks	Year	Production	Consumption Tons	Consumption % to Crude	Stocks
1930	157,968	153,500	40.9	22,000	1935	122,948	117,523	23.9	17,000
1931	129,690	123,000	35.1	21,714	1936	150,571	141,486	24.6	19,000
1932	75,656	77,500	23.3	16,334	1937	185,033	162,000	29.8	28,800
1933	93,587	85,000	21.2	17,780	1938	122,400	120,800	29.9	23,000
1934	108,162	100,855	22.3	20,000	1939	186,000	170,000	28.7	25,250

Figures on Monthly Basis

1939									
Jan.	13,870	12,633	26.7	22,350	July	11,777	12,448	27.7	21,269
Feb.	13,193	12,269	28.3	22,644	Aug.	16,461	15,485	29.9	21,402
Mar.	14,638	14,888	29.0	21,638	Sep.	16,830	15,583	30.3	21,384
Apr.	13,591	12,309	27.2	22,172	Oct.	19,549	17,423	30.5	21,694
May	13,817	12,425	27.3	22,556	Nov.	19,417	16,551	29.7	23,239
June	14,848	13,669	28.2	22,976	Dec.	18,009	14,317	28.8	25,250
1940:									
Jan.	19,297	16,070	29.2	27,418	July	.....	.....	...	.....
Feb.	17,992	15,370	30.8	28,603	Aug.	.....	.....	...	.....
Mar.	17,234	15,931	31.7	28,488	Sep.	.....	.....	...	.....
Apr.	16,568	16,298	32.5	27,558	Oct.	.....	.....	...	.....
May	17,552	15,719	30.5	28,397	Nov.	.....	.....	...	.....
June	16,631	15,844	34.1	28,327	Dec.	.....	.....	...	.....

Note: The above figures are based on the annual surveys conducted by the Leather and Rubber Division, Bureau of Foreign & Domestic Commerce, Washington, D. C., with the exception of those for the current year which are estimates made by the Rubber Manufacturers Association. They are revised frequently and the latest available issue should always be consulted for the most reliable figures. The annual figures are more accurate. Stocks shown are those on hand at the end of the indicated month or year.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1938	1939	1940		1938	1939	1940
January	35,323	37,767*	40,370	August	50,549	53,828*	.....
February	31,981	34,595	37,557	September	46,150	49,347	.....
March	41,409	42,520	44,607	October	46,365	49,687	.....
April	43,430	43,977	47,683	November	45,084	47,275	.....
May	44,937	49,547	52,946	December	41,742	43,694	.....
June	48,383	49,812	55,459				
July	47,650	50,508	.....	Total	523,003	552,557*	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138
1931	11,253,800	1935	18,664,107	1939	17,471,914

1940		1940		1940	
January ...	2,163,914	May	1,743,786	September ..	.....
February ..	1,850,383	June	1,266,300	October ...	.....
March	1,918,241	July	.....	November ..	.....
April	1,822,686	August	.....	December ..	....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1938																																
May	———	11¼	11½	11⅜	11⅜	11⅜	11⅜	———	11⅜	12	11⅜	12	11⅜	11⅜	———	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	———	———	11⅜	11⅜	11⅜	11⅜	———	———	———	11⅜	11⅜
June	.....	11¼	11¼	———	11½	11½	11½	11⅜	12⅛	12	12⅛	12⅛	12⅛	12	12⅝	12⅛	12⅝	12⅝	12⅝	12⅛	12⅛	13⅜	13⅛	13⅛	13⅛	13⅛	14⅜	13⅝	14⅛	14⅛	———	12⅜
July	.....	———	———	14¾	15⅛	15⅛	15⅛	15⅛	———	14¾	15⅛	15⅛	15⅛	14⅞	15⅛	15⅛	15⅝	15⅝	15⅝	15⅛	15⅛	15⅜	15⅜	———	15⅛	15⅛	16¼	16⅛	16⅛	15⅞	———	15⅜
August	...	15⅛	15⅛	15⅛	16	———	16⅛	16⅛	16⅛	15⅛	15⅛	15⅛	15⅛	———	———	15⅝	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	———	16⅛
Sept.	.....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	.....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	.....	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	.....	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
1939																																
Jan.	.....	15⅜	———	16⅛	16	———	16	———	15⅛	16	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	———	15⅜	15⅜	15⅜	15⅜	15⅜	———	15⅞	15⅜	15⅜
Feb.	.....	15⅜	———	15⅛	———	———	15⅛	———	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	———	———	16	16
March	...	16⅛	———	16⅛	16	———	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16	15⅞	16⅛	16⅛
April	.....	15⅞	———	15⅞	15⅞	———	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
May	.....	15⅞	———	15⅞	15⅞	———	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
June	.....	16⅛	———	16⅛	16⅛	———	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
July	.....	16⅛	———	16⅛	16⅛	———	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
August	....	16⅛	———	16⅛	16⅛	———	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
September	..	19⅛	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾
October	..	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾
November	..	20⅛	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
December	..	20	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———	———
1940																																
January	...	19⅛	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾
February	..	18¾	18¾	18¾	18½	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾
March	....	18⅛	18⅛	18½	18⅜	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛
April	.....	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜	18⅜
May	.....	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼
June	.....	22	———	20	20	———	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
July	.....	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝
August	....	19⅞	19⅞	———	———	19⅞	19⅞	19¾	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1913-1932

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1913	32.04	1917	72.23	1921	16.36	1925	72.46	1929	20.59
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17
1916	72.50	1920	19.24	1924	26.20	1928	22.48	1932	3.49

Average Monthly Price per Pound Since 1933

	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents	1940 Cents
Jan.	3.08	9.32	13.10	14.35	21.37	14.63	15.75	19.06
Feb.	2.95	10.45	12.92	15.48	21.33	14.71	15.93	18.83
Mar.	3.01	11.01	11.51	15.89	24.09	13.55	16.26	18.58
Apr.	3.56	12.10	11.55	15.98	23.44	11.84	15.87	19.16
May	4.95	13.26	12.05	15.62	21.14	11.57	16.07	21.21
June	6.15	13.51	12.57	15.85	19.29	12.57	16.37	22.20
July	8.01	14.60	12.10	16.49	18.86	15.37	16.51	21.12
Aug.	7.31	15.47	11.98	16.25	18.37	16.08	16.67	
Sept.	7.30	15.36	11.55	16.46	18.55	16.15	21.24	
Oct.	7.64	13.96	12.62	16.55	16.28	16.89	19.89	
Nov.	8.66	13.04	13.15	17.97	14.60	16.24	20.21	
Dec.	8.87	12.98	13.28	20.01	15.41	16.05	20.01	
Average for Year	5.96	12.92	12.37	16.41	19.39	14.64	17.57	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1940 May	1940 June	1940 July	1940 Aug.	Day	1940 May	1940 June	1940 July	1940 Aug.
1	11	———	12⅞	13	17	11⅛	14¼	12⅞	
2	11⅛	———	13	12⅛	18	———	———	12⅞	
3	11¼	12⅞	12⅞	———	19	———	———	12⅞	
4	———	12⅞	12½	———	20	11¼	———	———	
5	———	12⅝	12½	12⅛	21	11⅛	———	———	
6	11⅛	12¼	———	13⅛	22	11⅛	———	12⅛	
7	11⅜	12⅜	———	13⅜	23	11⅛	———	12¼	
8	11½	———	12½	13	24	11½	———	12⅛	
9	11½	———	12½	13	25	———	———	12⅛	
10	12⅛	12⅝	12½		26	———	———	12⅛	
11	———	13⅛	12½		27	11⅛	———	———	
12	———	13⅜	12¼		28	11⅛	———	———	
13	11⅞	13⅜	———		29	11⅜	———	12⅛	
14	11⅛	13⅛	———		30	11⅞	———	12⅝	
15	11⅞	———	12		31	11⅛	———	12⅞	
16	11⅛	———	11⅞						

Average Monthly Price Per Pound

Month	1937 Pence	1938 Pence	1939 Pence	1940 Pence	Month	1937 Pence	1938 Pence	1939 Pence	1940 Pence
Jan.	10.378	7.077	7.926	11.793	Aug.	8.830	7.841	8.545	
Feb.	10.503	7.029	7.942	12.577	Sept.	8.935	7.918	9.634	
Mar.	11.766	6.590	8.120	11.651	Oct.	7.855	8.355	10.177	
Apr.	11.471	5.793	7.910	10.980	Nov.	7.080	8.111	11.210	
May	10.250	5.632	8.002	11.600	Dec.	7.332	8.005	11.559	
June	9.548	6.147	8.216	13.046	Average for Year.	9.424	7.164	8.959	
July	9.136	7.464	8.271	12.410					

Note: No quotations were made in the London market from June 17 through June 30. Accordingly, the average for the month is based on the first eleven trading days only.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1940 June	1940 July	1940 Aug.	Date	1940 June	1940 July	1940 Aug.	Date	1940 June	1940 July	1940 Aug.
1	10.21	10.69	10.17	11	10.65	10.58		22	11.02	10.24	
2	———	10.63	10.18	12	10.85	10.50		23	———	10.23	
3	10.12	10.70	10.16	13	10.86	10.48		24	11.04	10.33	
4	10.13	———		14	11.01	———		25	10.82	10.28	
5	10.18	10.46	10.11	15	11.11	10.50		26	10.96	10.23	
6	10.31	10.71	10.06	16	———	10.56		27	10.93	10.19	
7	10.56	———	10.02	17	10.89	10.43		28	10.85	———	
8	10.43	10.60	10.08	18	11.03	10.31		29	10.73	10.16	
9	———	10.48	9.98	19	11.14	10.29		30	———	10.20	
10	10.42	10.58		20	10.87	10.26		31	———	10.19	
				21	10.93	———					

Average Monthly Price Per Pound

	1937 Cents	1938 Cents	1939 Cents	1940 Cents		1937 Cents	1938 Cents	1939 Cents	1940 Cents
Jan.	13.06	8.57	8.94	11.19	Aug.	10.41	8.41	9.30	
Feb.	13.15	8.91	8.97	11.10	Sept.	9.02	8.17	9.30	
Mar.	14.46	8.92	9.00	10.90	Oct.	8.42	8.61	9.24	
Apr.	14.23	8.76	8.87	10.89	Nov.	7.96	9.08	9.73	
May	13.34	8.50	9.56	10.33	Dec.	8.26	8.72	10.97	
June	12.70	8.38	9.88	10.72	Average for Year	11.44	8.66	9.46	
July	12.26	8.85	9.71	10.42					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of:	ON HAND 1938	1939	1940	AFLOAT 1938	1939	1940	ON HAND AND AFLOAT 1938	1939	1940
Jan.	276,497	220,727	142,368	57,356	48,210	90,285	333,853	268,937	232,653
Feb.	292,067	207,882	134,328	47,459	55,814	112,257	339,526	263,696	246,585
Mar.	301,762	201,752	142,414	41,882	55,981	113,619	343,644	257,733	256,033
Apr.	303,901	188,074	162,459	39,071	57,918	102,557	342,972	245,992	265,016
May	300,907	187,980	161,446	32,859	54,046	109,364	333,766	242,026	270,810
June	294,796	173,493	168,235	32,079	51,274	119,138	326,875	224,767	287,373
July	282,785	165,450		40,400	52,990		323,185	218,440	
Aug.	273,841	152,029		47,772	66,717		321,613	218,746	
Sept.	268,094	136,824		48,927	68,310		317,021	205,134	
Oct.	259,074	119,404		51,062	100,500		310,136	219,904	
Nov.	242,592	105,205		51,114	114,044		293,706	219,249	
Dec.	231,500	125,800		45,105	91,095		276,605	216,895	

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1938	1939	1940	Liverpool 1938	1939	1940
January	40,203	51,420	12,000*	21,711	28,789	8,000*
February	46,596	48,312	10,000*	24,737	26,784	7,000*
March	50,233	46,768	10,000*	26,220	24,996	8,000*
April	54,296	44,760	12,000*	28,277	23,742	10,000*
May	57,194	43,454	12,000*	29,862	22,211	9,000*
June	60,307	42,374	11,000*	31,837	21,176	8,500*
July	62,236	37,772		32,825	19,116	
August	65,113	28,363		34,315	16,218	
September	63,321	24,965*		34,645	14,054*	
October	59,609	23,685*		33,483	13,336*	
November	57,794	23,244*		32,116	13,087*	
December	55,668	19,545*		31,012	11,006*	

* Estimated.

(Figures up to August, 1939, from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1939					
March	**23,255**	**58,005**	**3,389**	**137**	**2,244***
April	**22,434**	**55,238**	**3,648**	**131**	**2,209**
May	**20,849**	**52,837***	**4,005**	**136**	**1,966**
June	**19,563***	**55,834**	**3,771**	**101**	**1,821**
July	**27,042**	**55,948**	**4,217**	**188**	**1,474**
August	**20,543***	**50,625**	**3,134**	**315**	**1,914**
September	**23,457***	**52,755**	**2,742**	**...**	**2,682**
October	**25,376***	**46,264**	**3,335**	**...**	**3,419**
November	**22,957***	**45,133**	**5,289**	**...**	**4,510**
December	**15,299***	**54,868**	**5,149**	**...**	**5,336**
At end of 1940					
January	35,928	60,504	5,755	....	2,862
February	33,563*	52,615	4,452	....	2,869
March	23,830*	48,180	3,369	....	3,246
April	42,239	50,656	4,749	....	2,715
May	32,770	45,715	3,774	....	1,743

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only. * Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1939				
June	**51,274**	**25,260**	**11,466**	**88,000**
July	**32,990**	**31,000**	**21,010**	**105,000**
August	**66,717**	**30,000**	**23,283**	**120,000**
September	**68,310**	**30,000**	**35,690**	**134,000**
October	**100,500**	**35,000**	**37,500**	**173,000**
November	**114,044**	**35,000**	**21,956**	**171,000**
December	**91,095**	**35,000**	**25,905**	**152,000**
End of: 1940				
January	90,285	40,000	44,715	175,000
February	112,257	40,000	40,743	193,000
March	113,619	45,000	52,381	211,000
April	102,557	45,000	40,443	188,000
May	109,364	45,000	55,636	210,000
June	119,138	50,000	65,862	235,000

* ***Total Afloat*** **is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce.** ***All Other Afloat*** **is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.**

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1935	1936	1937*	1938*	1939	1940
January	698,153	600,479	454,249	549,762	497,665	433,841
February	686,195	599,355	445,265	565,833	479,578	429,551
March	678,809	583,318	447,856	586,666	460,723	447,472
April	677,006	567,172	428,249	586,291	438,252	465,345
May	677,569	541,871	413,134	568,158	429,979	470,981
June	671,525	520,255	434,250	573,136	407,640	500,774
July	679,061	519,074	445,782	580,654	418,639	.....
August	680,644	500,520	457,462	565,394	397,345	.....
September	661,509	493,585	470,768	551,447	396,867	.....
October	655,000	486,159	479,398	540,976	413,274*	.....
November	617,300	466,491	493,266	512,196	395,217	.....
December	613,987	466,576	545,533	482,852	391,125	.....
Monthly Avge.	666,397	528,738	460,022	555,280	427,192	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,635	13,437	13,355	11,376	15,565	7,314	13,946	14,849
Apr.-June	14,412	13,565	12,597	14,892	15,834	7,380	13,759	15,648
July-Sept.	14,707	9,822	11,312	14,914	12,207	10,794	15,182	.....
Oct.-Dec.	9,550	10,406	12,099	14,858	9,704	12,360	14,726	.....
Total	45,304	47,230	49,363	56,040	53,310	37,848	57,613	.....

Shipment Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	**6,981**	**10,730**	**11,154**	**10,554**	**14,143**	**7,388**	**12,445**	**12,728**
Apr.-June	15,139	14,998	13,473	15,940	15,741	9,564	15,107	17,449
July-Sept.	13,707	11,648	13,489	14,037	13,106	11,243	15,791	.....
Oct.-Dec.	8,265	9,310	12,066	12,855	10,495	12,098	14,165	.....
Total	44,092	46,686	50,182	53,386	53,485	40,293	57,508	.....

Inventory Figures [2]

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	**7,290**	**11,651**	**11,675**	**8,762**	**12,004**	**10,547**	**9,963**	**10,747**
Apr.-June	6,615	10,219	10,755	7,556	12,081	8,337	8,632	8,985
July-Sept.	7,595	8,419	8,288	8,690	11,200	7,859	8,080	.....
Oct.-Dec.	8,888	9,455	8,196	10,717	10,383	8,166	8,665	.....

Figures for Recent Months

	PRODUCTION 1938	1939	1940	SHIPMENTS 1938	1939	1940	INVENTORY [2] 1938	1939	1940
Apr.	2,706	4,310	5,106	3,211	4,458	5,010	10,141	9,813	10,881
May	2,711	4,473	5,415	3,346	4,800	5,720	9,521	9,540	10,576
June	3,091	4,976	5,127	3,979	5,849	6,719	8,470	8,632	8,985

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,230	12,823	12,553	11,891	15,831	7,314	12,383	12,815
Apr.-June	13,001	13,191	11,631	14,624	15,413	7,380	11,847	13,704
July-Sept.	14,356	10,321	11,270	15,320	12,038	10,794	13,118	.....
Oct.-Dec.	9,000	9,891	12,425	15,201	9,092	12,360	13,300	.....
Total	42,587	46,226	47,879	57,036	52,374	37,848	50,648	.....

Shipment Figures on Quarterly Basis

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,539	10,640	11,252	11,367	14,606	7,387	11,422	11,684
Apr.-June	13,292	14,553	11,928	15,113	15,495	9,564	13,010	14,957
July-Sept.	13,370	11,545	13,251	15,069	12,901	11,243	13,449	.....
Oct.-Dec.	8,189	8,306	11,636	12,874	9,765	12,099	13,309	.....
Total	41,390	45,044	48,067	54,423	52,767	40,293	51,190	.....

Inventory Figures [2]

Quarter	1933	1934	1935	1936	1937	1938	1939	1940
Jan.-Mar.	6,369	10,244	10,406	8,660	11,993	10,547	8,752	8,247
Apr.-June	6,097	8,795	10,050	8,075	11,833	8,337	7,549	6,914
July-Sept.	7,008	7,639	7,565	8,595	11,326	7,859	7,206	.....
Oct.-Dec.	7,815	9,180	8,231	10,945	10,312	8,166	7,036	.....

Figures for Recent Months

	PRODUCTION 1938	1939	1940	SHIPMENTS 1938	1939	1940	INVENTORY [2] 1938	1939	1940
Apr.	2,258	3,852	4,618	2,860	3,940	4,543	9,917	8,653	8,258
May	2,325	3,746	4,739	2,974	4,034	4,739	9,265	8,373	8,243
June	2,797	4,249	4,347	3,730	5,036	5,675	8,337	7,549	6,914

[1] These figures are based on reports received from the Rubber Manufacturers Association. They are revised frequently and the latest available issue should be consulted for most reliable figures.

[2] Stocks held by manufacturers at end of period indicated.

Automobile Production

Year	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,085	2,000,985	488,100	166,086	123,761	42,325	2,655,171
1939*	3,577,292	2,866,796	710,496	155,316	108,806	46,510	3,732,608
1939							
Oct.*	313,392	251,819	61,573	11,296	7,791	3,505	324,688
Nov.*	351,785	285,252	66,533	16,756	9,882	6,874	368,541
Dec.*	452,142	373,804	78,338	16,978	11,491	5,487	469,120
1940							
Jan.*	432,279	362,897	69,382	17,213	12,579	4,634	449,492
Feb.*	404,032	337,756	66,276	18,193	12,779	5,414	422,225
Mar.*	423,620	352,922	70,698	16,612	12,025	4,587	440,232
Apr.	432,746	362,139	70,607	19,687	13,487	6,200	452,433
May	391,215	325,676	65,539	21,277	12,677	8,600	412,492
June	344,636	286,040	58,596	17,930	8,739	9,191	362,566

* Revised.

Note: U. S. figures represent factory sales; Canadian figures represent production.

ADVERTISING PAGES REMOVED

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							NETHERLAND INDIES [4]							
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Thailand [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,536
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,382	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,883	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1939	553,324	177,851	375,473	61,026	15,881	24,014	11,864	41,266	72,786	117,791	181,272	65,140	13,892	22,224	1,002,629
1939:															
Mar.	43,259	14,035	29,224	3,718	1,392	1,177	344	5,401	5,361	8,048	14,487	4,636	1,331	1,776	76,932
Apr.	43,658	13,996	29,662	2,225	1,260	2,446	1,687	2,660	5,321	9,250	13,768	2,581	1,139	1,753	73,751
May	42,214	12,697	29,517	2,805	1,670	1,649	558	2,782	4,105	8,168	12,155	4,585	874	1,672	70,540
June	31,541	9,567	21,974	3,708	1,435	1,157	332	1,748	5,839	8,846	12,824	4,030	591	1,825	64,309
July	45,962	20,052	25,910	5,019	1,285	3,092	1,603	5,599	5,229	11,020	19,431	3,367	1,019	1,804	84,378
Aug.	53,497	12,635	40,862	5,620	416	1,749	975	5,230	6,236	10,010	11,232	7,020	1,197	1,525	92,072
Sept.	45,094	18,302	26,792	6,064	780	1,932	429	4,670	5,168	10,278	22,270	5,943	1,131	1,832	87,289
Oct.	70,839	21,493	49,346	5,234	815	2,487	1,730	2,047	9,950	13,645	21,404	5,022	1,414	2,185	115,279
Nov.	49,276	13,657	35,619	4,405	819	2,023	1,322	1,428	5,827	10,239	14,163	6,540	1,055	2,191	85,631
Dec.	41,568	8,479	33,089	9,496	2,565	2,476	616	1,177	8,130	8,580	7,156	11,018	1,377	2,052	87,732
1940:															
Jan.	56,214	30,136	26,078	7,091	1,630	1,987	1,858	5,469	6,361	16,070	31,676	5,315	1,777	2,000*	107,212
Feb.	62,105	16,598	45,507	8,741	2,076	2,678	1,164	3,887	7,270	14,873	15,713	7,040	1,781	2,000*	112,376
Mar.	65,269	17,565	47,704	5,406	2,054	3,526	1,050	3,111	8,864	13,415	20,015	3,551	1,298	2,000*	111,994
Apr.	47,430	22,106	25,324	4,309	2,173	2,951	1,799	1,834	7,703	12,759	23,815	2,927	1,582	2,000*	89,206
May	74,682	16,946	57,736	7,274	2,229	2,696	1,370	2,582	8,416	11,904	20,009	4,000*	3,413	2,000*	121,629
June	60,814	15,529	45,285	5,597	1,896	4,077	1,421	3,000*	9,830	14,616	20,104	4,000*	1,045	2,000*	112,871

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,883	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,294	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1939:															
Mar.	45,286	8,082	4,503	8,036	2,458	4,019	1,525	2,000*	1,316	1,242	368	1,133	200*	463	80,631
Apr.	31,590	4,752	5,639	8,719	1,466	3,579	1,926	2,000*	1,108	855	333	1,062	200*	597	63,826
May	45,390	7,531	4,646	8,413	3,006	4,438	1,573	2,000*	1,188	792	518	1,654	200*	618	81,967
June	33,951	8,439	4,649	8,190	2,423	3,067	1,992	2,000*	1,308	621	672	2,703	200*	487	70,702
July	36,932	4,040	4,282	8,437	3,164	3,668	1,350	1,000*	1,422	859	565	824	200*	412	67,155
Aug.	38,319	2,044	4,000*	....	2,033	3,145	1,500*	2,000*	2,182	952	651	1,546	200*	400*	58,972
Sept.	36,197	4,406	4,000*	....	2,639	9,254	1,500*	2,000*	875	108	222	1,200*	200*	...	63,572
Oct.	39,735	8,530	5,000*	....	5,787	2,749	1,500*	2,000*	1,235	519	653	1,200*	200*	...	69,589
Nov.	41,478	10,500*	5,000*	....	1,709	5,104	1,500*	2,000*	1,200*	667	613	1,200*	200*	...	71,504
Dec.	70,303	5,200*	5,000*	....	3,025	3,961	1,500*	2,000*	1,200*	1,035	1,827	1,200*	200*	...	94,702
1940:															
Jan.	71,565	450	5,000*	....	5,047	4,540	1,500*	2,000*	1,200*	891	682	1,200*	200*	.....	.....
Feb.	41,797	7,500	5,000*	....	3,508	5,241	....	.....	.....	694	495	1,200*	200*	.....	.....
Mar.	58,302	14,200	....	....	3,062	6,057	....	.....	.....	.....	627	.....	.....	.....	.....
Apr.	70,135	16,400	....	....	3,096	....	....	.....	.....	.....	.....	.....	.....	.....	.....
May	50,610	10,000	....	....	3,108	....	....	.....	.....	.....	.....	.....	.....	.....	.....
June	53,266	9,500	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

HOW MUCH SHALL I ORDER FOR THE NEXT FOUR MONTHS?
VISCOSITIES HARDLY EVER THE SAME!
THAT'S ME—SMALL USER, LARGE PAYER.
MUST REMEMBER WE ARE SHORT OF ACCELERATOR.
ANOTHER BATCH SPOILED!!!!!!!!!!!!!!
WHAT AM I GOING TO DO WITH ALL THESE "SECONDS" AND SCRAP?
MUST I ALWAYS HAVE THESE HEADACHES??
DO I NEED ALL THAT EQUIPMENT?
9-MINUTE CURE LAST MONTH, 12 MINUTES THIS MONTH?
DO I HAVE TO WATCH EACH AND EVERY BATCH?
DO I HAVE TO READ ALL THIS TECHNICAL INFORMATION?
If You Are A Latex User...
DON'T PLACE YOURSELF ON THIS SPOT

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FORGET YOUR LATEX WORRIES. Turn them over to us at Naugatuck. We worried so much over these same worries that we worried them right out of existence.

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Division of United States Rubber Company
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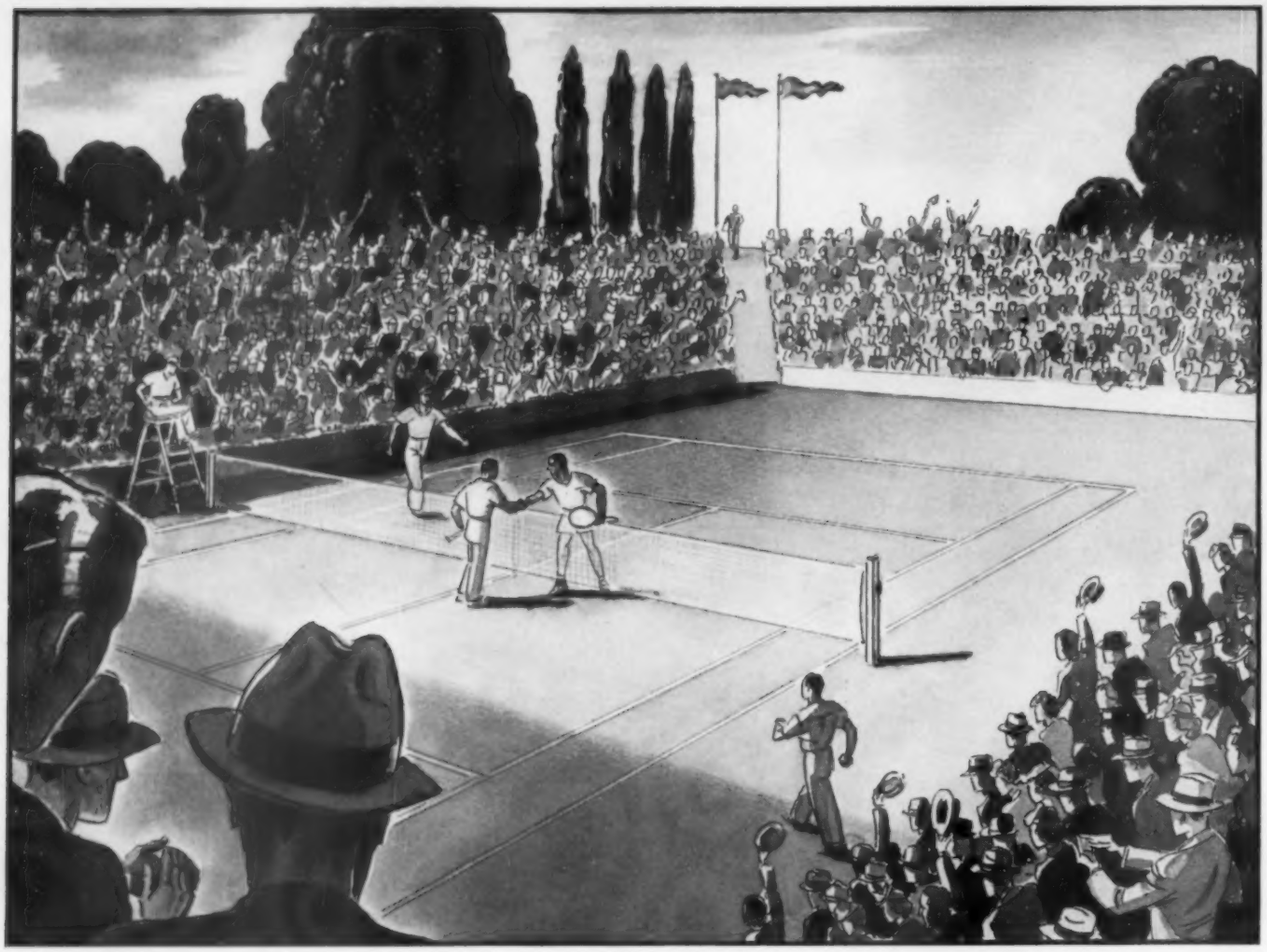

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As original developers of titanium pigments, the makers of TITANOX provided a pigment with nearly six times the strength of older pigments—and made possible a saving of more than 50 per cent on pigment cost. They have devoted their entire effort to improving the original titanium pigments and to obtaining better results from their use. They have sponsored all major developments in these pigments, and posted the rubber industry in regard to them.

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85th Anniversary

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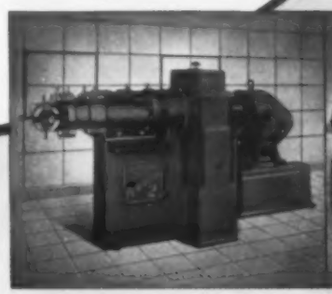
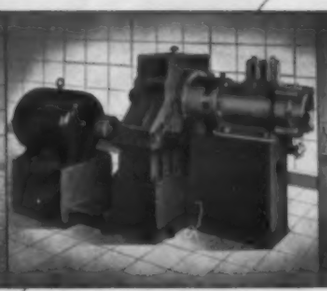
3½-inch Strainer, bolted head

3½-inch Tuber, with soapstoning equipment



Resin-Type Extruder arranged for wire-covering



4½-inch Tubing Machine, drive side, showing typical motor application

4½-inch Insulating Machine

1855-1880-1940... Milestones

Throughout these unfolding years we have been privileged to build Royle Machinery for manufacturers in almost every country in the world. We are grateful for these opportunities and covet for our friends in the rubber industry every success . . . and for ourselves your continued friendship and respect. By this we measure *our* success.

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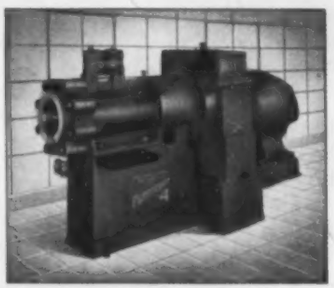

6-inch Tubing Machine

6½-inch Straining Machine, with patented expansion head and lever-operated breech-lock

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Eighty-five years' experience has been livened by young ideas. Today, sixty years after introducing the first tubing machine, we proudly present Royle Extruding Machines that are in every sense the *Aristocrats* of the industry, with enclosed self-lubricating worm or herringbone gear drive; roller thrust bearings; hard, corrosion-resistant cylinder liners; stock screws engineered for individual applications; efficient die-heads for every form of tubing, straining, insulating.

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Losses caused by moisture absorption are less than ½ of 1% during a period of three months' storage under normal storage conditions, as compared to much higher losses in magnesium packed in other types of containers.

Standardize now in K&M LIGHT MAGNESIUM OXIDE, TECHNICAL. Samples for testing will be sent to you promptly on request.

COMPOUND	
Neoprene E	100
K&M Light MgO. Tech.	10
FF Wood Rosin	5
Thermax	50
AgeRite Powder	2
Sulphur	1
Zinc Oxide	10

SET UP TESTS—WILLIAMS 3 MINUTE "Y" AT 100° C.			
No Heat	.070"		
After 1.5 hours in H_2O at 85° C.	.081"	Change	+15.7%
After 2 hours in H_2O at 85° C.	.085"	Change	+21.4%

Cure at 153° C.	Mod. at 300° Elong. Lbs./In.²	Tensile Strength Lbs./In.²	Elong. %	Shore Hardness
10 Min.	765	1435	695	60
20 Min.	810	1445	695	61
40 Min.	910	1485	625	63
60 Min.	940	1530	615	64

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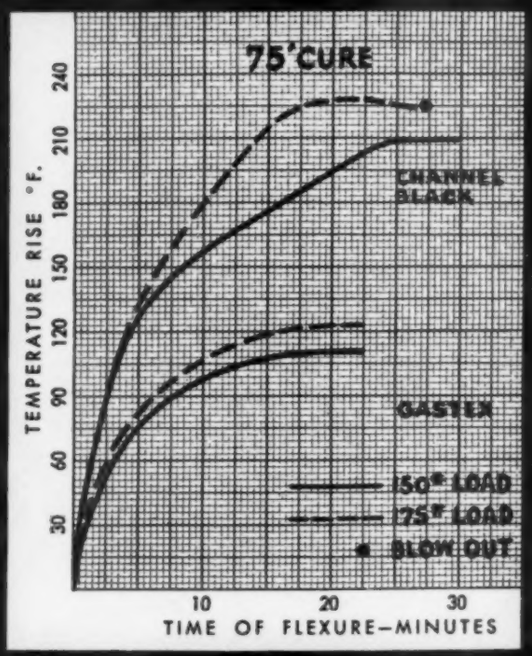

The National Safety Council, Inc. lists tire blowouts as an important cause of motor vehicle accidents.

Excessive heat build-up is a leading cause of tire failure. Because GASTEX stocks have a lower hysteresis loss and a higher thermal conductivity than channel black stocks, treads compounded with GASTEX run cooler and are therefore less susceptible to blowout. This added factor of safety—and economy—is especially important in high-speed bus and heavy duty truck tires. A compound containing combination loadings of GASTEX and channel black gives desirable low heat build-up with satisfactory tensile and abrasion properties.

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Fourth Volume of BIBLIOGRAPHY OF RUBBER LITERATURE for 1938 and 1939

***Compiled by* D. E. CABLE, Ph.D., Ch.E.**

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In other words this bibliography serves as the "clearing house" for all published information on every branch of rubber technology, manufacturing processes, cultivation, machinery and equipment, new rubber articles, latest compounding materials, etc.

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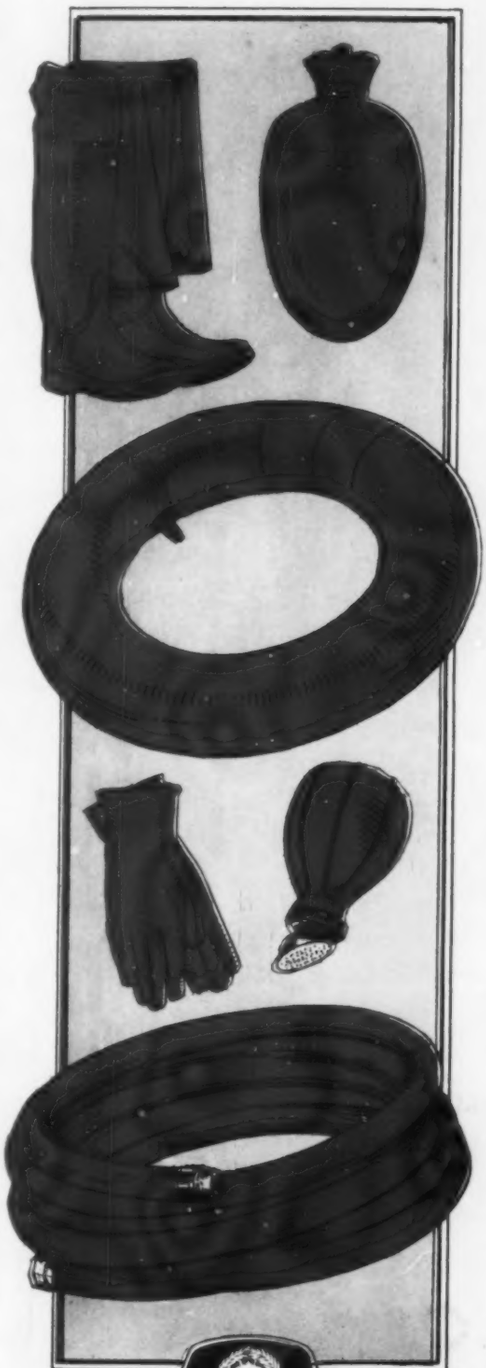

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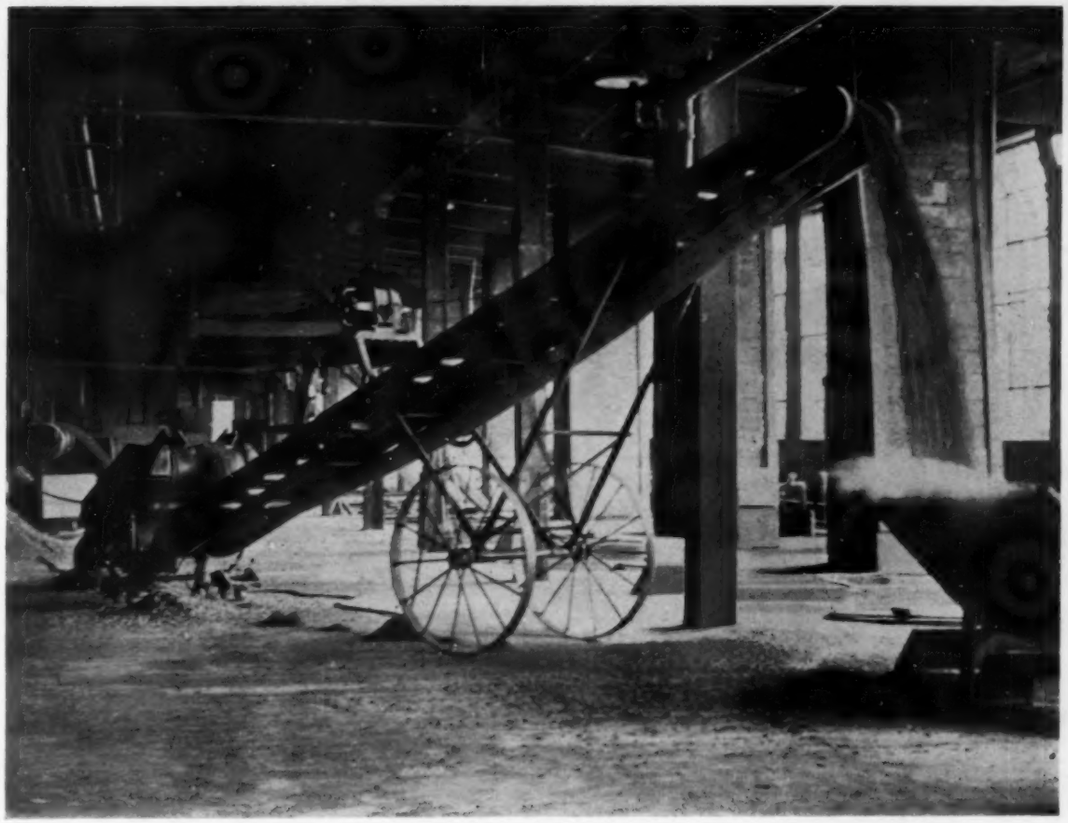

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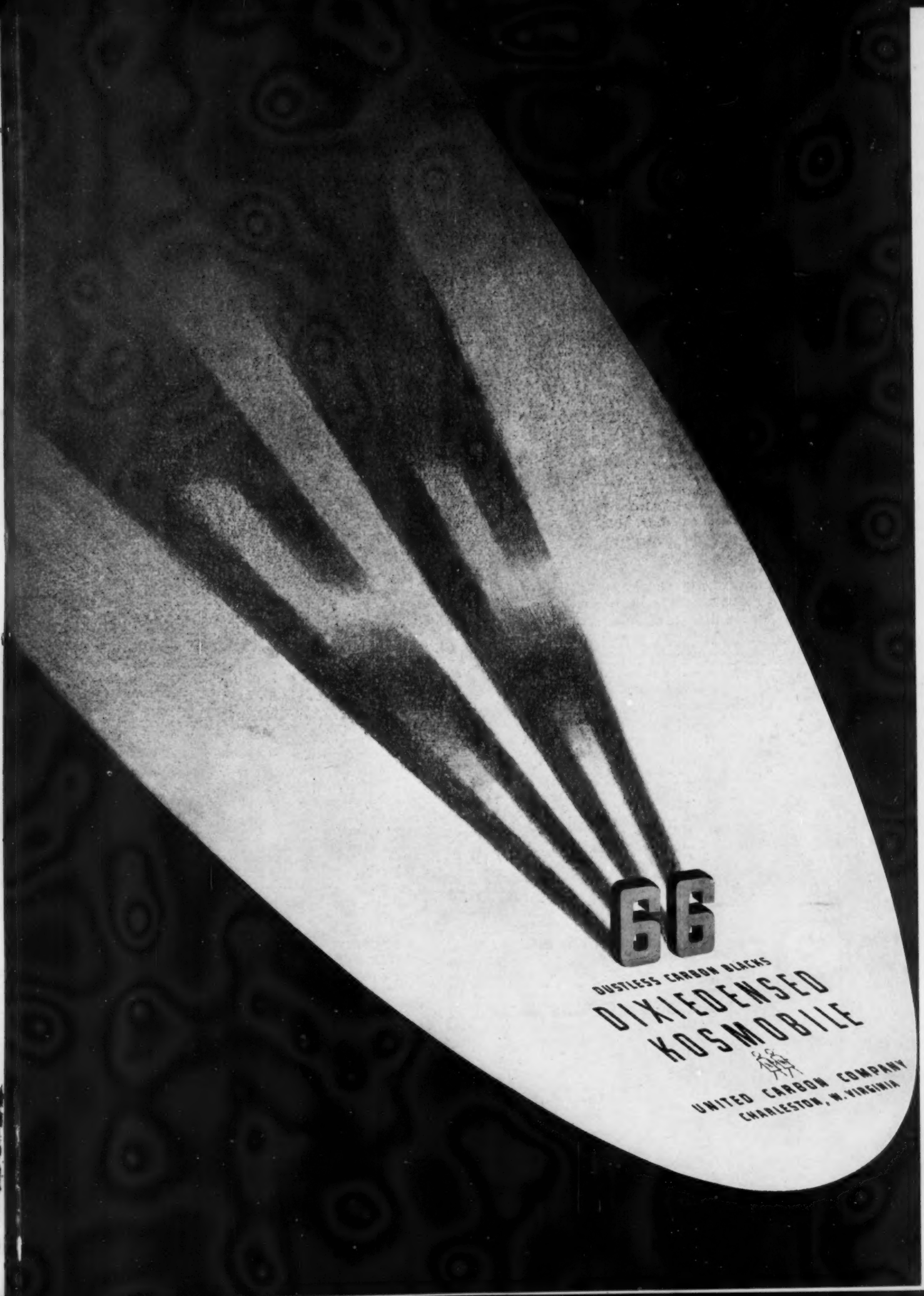
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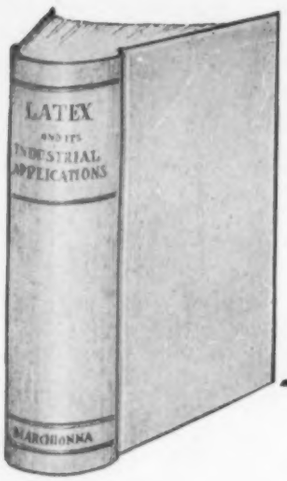

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USMC Cementing Equipment

Rotary Cementing Machine—Model RB

THE ROTARY CEMENTING MACHINE — MODEL RB, for cementing insoles, is motor-driven, floor type, with a capacity of 15,000 to 20,000 pairs of insoles daily.

THE USMC DOUBLE CEMENTING MACHINE —MODEL B, is especially designed for cementing both sides of rag fillers, juniors, etc. A floor machine, motor-driven, with a capacity of 12,000 to 15,000 pairs daily.

¶The installation of these machines will enable rubber shoe manufacturers to handle efficiently their major cementing operations with appreciable savings in labor, cement, and floor space.

Machines may be used as separate units, or in conjunction with a conveyor system

USMC Double Cementing Machine—Model B

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Cincinnati, Ohio.....407 East Eighth
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